SIEMENS

RUGGEDCOM MX5000RE

Installation Guide

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RC1060-EN-12

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Preface

This guide describes the RUGGEDCOM RUGGEDCOM MX5000RE. It describes the major features of the device, installation, commissioning and important technical specifications.

It is intended for use by network technical support personnel who are responsible for the installation, commissioning and maintenance of the device. It is also recommended for use by network and system planners, system programmers, and line technicians.

CONTENTS

Alerts

The following types of alerts are used when necessary to highlight important information.

DANGER!
DANGER alerts describe imminently hazardous situations that, if not avoided, will result in death or serious injury.

WARNING!
WARNING alerts describe hazardous situations that, if not avoided, may result in serious injury and/or equipment damage.

CAUTION!
CAUTION alerts describe hazardous situations that, if not avoided, may result in equipment damage.

IMPORTANT!
IMPORTANT alerts provide important information that should be known before performing a procedure or step, or using a feature.

NOTE
NOTE alerts provide additional information, such as facts, tips and details.

Related Documents

Other documents that may be of interest include:

- *ROX II CLI User Guide* [https://support.industry.siemens.com/cs/ww/en/view/109481701]
- *ROX II Web Interface User Guide* [https://support.industry.siemens.com/cs/ww/en/view/109481702]
- *RUGGEDCOM Module Catalog* [https://support.industry.siemens.com/cs/ww/en/view/109748780]

Accessing Documentation

The latest user documentation for RUGGEDCOM MX5000RE is available online at https://www.siemens.com/ruggedcom. To request or inquire about a user document, contact Siemens Customer Support.

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Siemens' Educational Services team thrives on providing our customers with the essential practical skills to make sure users have the right knowledge and expertise to understand the various technologies associated with critical communications network infrastructure technologies.

Siemens' unique mix of IT/Telecommunications expertise combined with domain knowledge in the utility, transportation and industrial markets, allows Siemens to provide training specific to the customer's application.

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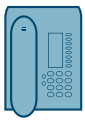
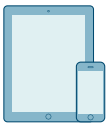
Online

Visit http://www.siemens.com/automation/support-request to submit a Support Request (SR) or check on the status of an existing SR.



Telephone

Call a local hotline center to submit a Support Request (SR). To locate a local hotline center, visit http://www.automation.siemens.com/mcms/aspa-db/en/automation-technology/Pages/default.aspx.



Mobile App

Install the Industry Online Support app by Siemens AG on any Android, Apple iOS or Windows mobile device and be able to:

- Access Siemens' extensive library of support documentation, including FAQs and manuals
- Submit SRs or check on the status of an existing SR
- Contact a local Siemens representative from Sales, Technical Support, Training, etc.
- Ask questions or share knowledge with fellow Siemens customers and the support community

1 Introduction

The RUGGEDCOM RUGGEDCOM MX5000RE is a MIL-STD, high-port density routing and switching platform, designed to operate in the most demanding environments.The RUGGEDCOM MX5000RE can withstand high levels of electromagnetic interference, radio frequency interference, and a wide temperature range of -40 to 85 °C (-40 to 185 °F). The RUGGEDCOM MX5000RE is designed to meet the challenging climatic and environmental demands found in utility, industrial, and military network applications.

The RUGGEDCOM MX5000RE's superior hardware design, coupled with the embedded RUGGEDCOM MX5000RE operating system, provides improved system reliability for the most demanding network applications. The cyber security and networking features make it ideally suited for creating secure Ethernet networks for mission critical, real-time, control applications.

The RUGGEDCOM MX5000RE is a scalable, modular platform providing the ability to change the configuration as the network grows and needs change.

The enclosure is a tough, welded aluminum, hard-mount enclosure built to house Siemens networking products and provide MIL-STD ratings for shock, vibration, emissions, immunity, temperature, and humidity. Ten external patch panels with up to 64 MIL grade round connectors provide tremendous flexibility and allow the enclosure to be employed in many diverse applications. A variety of patch panel cable assemblies allow convenient and simple mapping from internal electronics to the outside world.

The enclosure is rated for IP65 ingress protection, meaning that it is dust tight and can withstand water from a nozzle in any direction. Constructed with aluminum extrusions with fins on both sides and combined with high reliability internal circulation fans, the enclosure optimizes heat transfer without the exchange of outside air and improves the MTBF for the enclosed electronics.

The RUGGEDCOM MX5000 installed with the enclosure provides an extremely flexible package with MIL-STD approvals, continuing Siemens's tradition of pioneering advanced networking solutions specifically for the harsh environments found in military applications.

This section provides more information about the RUGGEDCOM MX5000RE.

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Section 1.1
Feature Highlights

Ethernet Ports

- Up to 48 x 10/100Base-TX copper Ethernet ports
- Up to 48 x 100Base-FX fiber optical Ethernet ports
- Up to 2 x Gigabit Ethernet ports
- Long-haul optics allow distances up to 90 km (56 mi)
- Multiple connector types: ST, MTRJ, LC, SC

Reliability in Harsh Environments

- Immunity to EMI and high voltage electrical transients
- Zero-Packet-Loss Technology
- -40 to 85 °C (-40 to 185 °F) operating temperature (no fans within chassis or modules)
- [Optional] Conformal coated printed circuit boards

Universal Power Supply Options

- Fully integrated, dual-redundant (optional) power supplies
- Universal high voltage ranges: 88-300 VDC or 85-264 VAC
- Terminal blocks for reliable maintenance-free connections
- CSA/UL 60950-1 safety approved to 85 °C (185 °F)

Enclosure Features

- Welded 6061-T4 aluminum extrusion construction
- Welded 6061-T6 aluminum mounting brackets for MIL901D hard mounting
- Configurable patch panel allows up to 64 MIL grade circular connectors for both copper and fiber media
- Integrated cable management for strain relief
- Removable front panel with EMI glass for service and maintenance
- Hard-mounted brackets fit standard 48 cm (19 in) rack mount equipment
- Dual internal MIL grade high reliability fans minimize internal temperature gradient with no outside air exchange
- IEC 60529 IP65 rated; dust tight, water jets

Section 1.2
Description

The RUGGEDCOM MX5000RE features various ports, controls and indicator LEDs on individual modules and the front panel for connecting, configuring and troubleshooting the device.

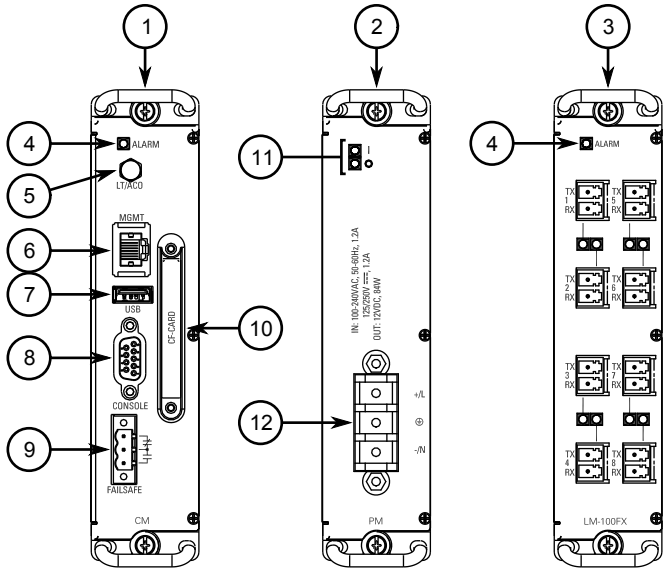


Figure 1: RUGGEDCOM MX5000RE Modules

1. Control Module **2.** Power Supply Module **3.** Line Module (Typical) **4.** Alarm Indicator LED **5.** Lamp Test/Alarm Cut-Off (LT/ACO) Button **6.** Management Ethernet Port **7.** Utility USB Port **8.** RS232 Serial Console Port (DB9) **9.** Failsafe Alarm Relay **10.** CompactFlash Card Port **11.** Power Supply Module Indicator LEDs **12.** Power Supply Terminal Block

When the RUGGEDCOM MX5000RE is configured for *rack front* mounting, these ports, controls and LEDs are located on the front panel.

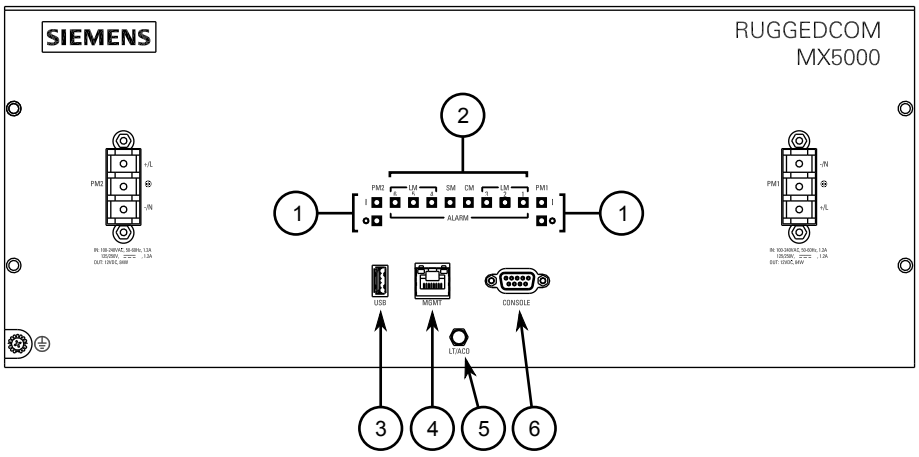


Figure 2: Front Panel

1. Power Supply Module Indicator LEDs **2.** Alarm Indicator LEDs **3.** Utility USB Port **4.** Management Ethernet Port **5.** Lamp Test/Alarm Cut-Off (LT/ACO) Button **6.** RS232 Serial Console Port (DB9)

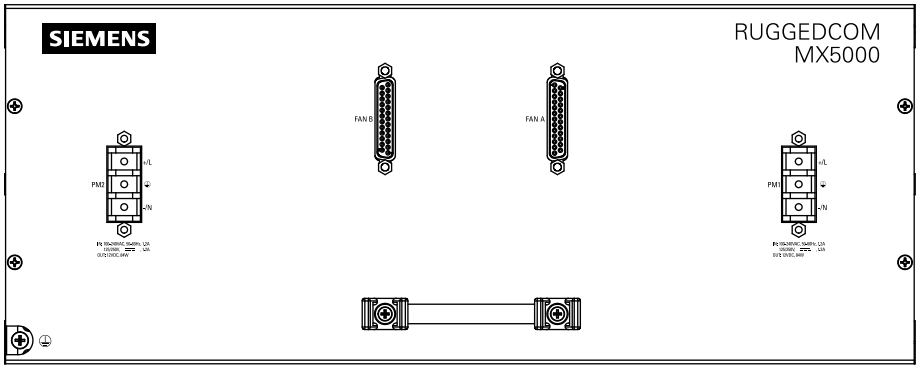


Figure 3: Front Panel – Fan Controller Option

Power Supply Module Indicator LEDs	Indicate the status of the power modules. • I = The power supply is receiving power • O = The power supply is supplying power
Alarm Indicator LED	Indicates when an alarm condition exists. • Green = Alarms cleared/acknowledged • Red = Alarm
Lamp Test/Alarm Cut-Off (LT/ACO) Button	This button performs two functions: • Press and hold this button to test all indicator LEDs • Press and release this button to acknowledge an active alarm
Management Port	This 10/100Base-T Ethernet port is used for system management that is out-of-band from the switch fabric.
Utility USB Port	Use the USB port to upgrade the RUGGEDCOM ROX II software or install files, such as configuration files and feature key files. For more information, refer to the *RUGGEDCOM ROX II User Guide* for the RUGGEDCOM MX5000RE.
Compact Flash Card Port	Houses the CompactFlash (CF) card that contains active and backup installations of RUGGEDCOM ROX II, along with the configuration database and other system data. For more information, refer to Section 3.3, "Accessing the CompactFlash Card".
RS232 Serial Console Port	The serial console port is for interfacing directly with the device and accessing initial management functions. For information about connecting to the device via the serial console port, refer to Section 3.1, "Connecting to the Device".
Failsafe Alarm Relay	Latches to default state when a power disruption or other alarm condition occurs. For more information, refer to: • Section 2.5, "Connecting the Failsafe Alarm Relay" • Section 5.2, "Failsafe Relay Specifications"
Power Supply Terminal Block	A pluggable terminal block. For more information, refer to Section 2.15, "Connecting Power".

Section 1.3

Required Tools and Materials

The following tools and materials are required to install the RUGGEDCOM MX5000RE:

Tools/Materials	Purpose
AC or DC power cord (16 AWG)	For connecting power to the device.
CAT-5 Ethernet cables	For connecting the device to the network.
Flathead screwdriver	For assembling the RUGGEDCOM MX5000RE
Phillips screwdriver	For assembling the RUGGEDCOM MX5000RE

Section 1.4
Cabling Recommendations

Before connecting the device, be aware of the recommendations and considerations outlined in this section.

CONTENTS

Section 1.4.1
Protection On Twisted-Pair Data Ports

All copper Ethernet ports on RUGGEDCOM products include transient suppression circuitry to protect against damage from electrical transients and conform with IEC 61850-3 and IEEE 1613 Class 1 standards. This means that during a transient electrical event, communications errors or interruptions may occur, but recovery is automatic.

Siemens also does not recommend using copper Ethernet ports to interface with devices in the field across distances that could produce high levels of ground potential rise (i.e. greater than 2500 V), during line-to-ground fault conditions.

Section 1.4.2
Gigabit Ethernet 1000Base-TX Cabling Recommendations

The IEEE 802.3ab Gigabit Ethernet standard defines 1000 Mbit/s Ethernet communications over distances of up to 100 m (328 ft) using all 4 pairs in category 5 (or higher) balanced, unshielded twisted-pair cabling. For wiring guidelines, system designers and integrators should refer to the Telecommunications Industry Association (TIA) TIA/EIA-568-A wiring standard that characterizes minimum cabling performance specifications required for proper Gigabit Ethernet operation. For reliable, error-free data communication, new and pre-existing communication paths should be verified for TIA/EIA-568-A compliance.

The following table summarizes the relevant cabling standards:

Cabling Category	1000Base-TX Compliant	Required Action
< 5	No	New wiring infrastructure required.

Cabling Category	1000Base-TX Compliant	Required Action
5	Yes	Verify TIA/EIA-568-A compliance.
5e	Yes	No action required. New installations should be designed with Category 5e or higher.
6	Yes	No action required.
> 6	Yes	Connector and wiring standards to be determined.

Follow these recommendations for copper data cabling in high electrical noise environments:

- Data cable lengths should be as short as possible, preferably 3 m (10 ft) in length. Copper data cables should not be used for inter-building communications.
- Power and data cables should not be run in parallel for long distances, and should be installed in separate conduits. Power and data cables should intersect at 90° angles when necessary to reduce inductive coupling.
- Shielded/screened cabling can be used when required. Care should be taken to avoid the creation of ground loops with shielded cabling.

Section 1.4.3
Supported Fiber Optic Cables

The following fiber optic cable types are supported under the stated conditions.

Cable Type	Wavelength (nm)	Modal Bandwidth (MHz·km)	Distance (m)		
			100Base-FX	1000Base-SX	10GBase-SR
OM1 (62.5/125)	850	200	—	275	33
	1300	500	2000	—	—
OM2 (50/125)	850	500	—	550	82
	1300	500	2000	—	—
OM3 (50/125)[a]	850	1500	—	550	300
	1300	500	2000	—	—
OM4 (50/125)[a]	850	3500	—	550	400
	1300	500	2000	—	—

[a] *Laser optimized.*

Section 1.5
Patch Panels

Every module slot in the RUGGEDCOM MX5000RE chassis is connected to a patch panel assembly in the enclosure. Patch panels are provided pre-assembled with the appropriate ports and wiring to make installation quick and simple.

The following maps the patch panels to their associated line module slot in the RUGGEDCOM MX5000RE chassis.

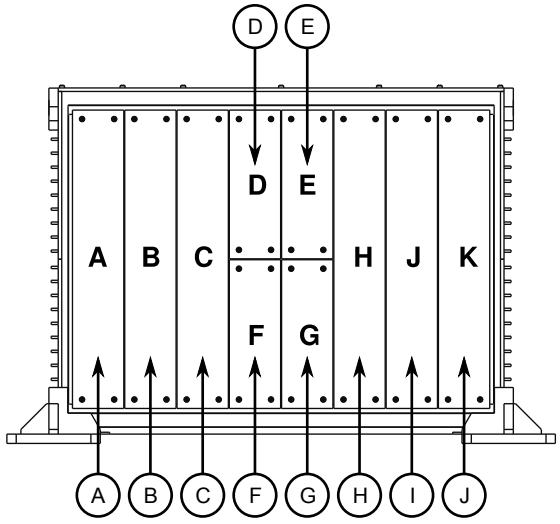


Figure 4: Patch Panels

Patch Panel	RUGGEDCOM MX5000RE Module Slot
A	LM1
B	LM2
C	LM3
D	CM
E	PM1
F	SM
G	PM2
H	LM4
I	LM5
J	LM6

For information about how to install patch panels, refer to Section 2.11, “Installing the Patch Panels”.

Section 1.6

Decommissioning and Disposal

Proper decomissioning and disposal of this device is important to prevent malicious users from obtaining proprietary information and to protect the environment.

Decommissioning

This device may include sensitive, proprietary data. Before taking the device out of service, either permanently or for maintenance by a third-party, make sure it has been fully decommissioned.

For more information, refer to the associated *User Guide*.

Recycling and Disposal

For environmentally friendly recycling and disposal of this device and related accessories, contact a facility certified to dispose of waste electrical and electronic equipment. Recycling and disposal must be done in accordance with local regulations.

2 Installing the Device

The following sections describe how to install the device, including mounting the device, connecting power, and connecting the device to the network.

DANGER!
Electrocution hazard – risk of serious personal injury and/or damage to equipment. Before performing any maintenance tasks, make sure all power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.

WARNING!
Burn hazard – risk of serious personal injury. Avoid contact with the surface of the unit. The metal surface may be hot due to the high allowable ambient temperature per specification.

Éviter tout contact avec la surface. La surface métallique peut être chaude a cause d'une température ambiante élevée selon les spécifications. S.V.P. se référer à la version française de ce guide pour les détails.

WARNING!
*Radiation hazard – risk of serious personal injury. This product contains a laser system and is classified as a **CLASS 1 LASER PRODUCT**. Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.*

IMPORTANT!
This product contains no user-serviceable parts. Attempted service by unauthorized personnel shall render all warranties null and void.

Changes or modifications not expressly approved by Siemens Canada Ltd could invalidate specifications, test results, and agency approvals, and void the user's authority to operate the equipment.

IMPORTANT!
*This product should be installed in a **restricted access location** where access can only be gained by authorized personnel who have been informed of the restrictions and any precautions that must be taken. Access must only be possible through the use of a tool, lock and key, or other means of security, and controlled by the authority responsible for the location.*

CONTENTS

Section 2.1

General Procedure

The general procedure for installing the device is as follows:

IMPORTANT!
The user is responsible for the operating environment of the device, including maintaining the integrity of all protective conductor connections and checking equipment ratings. Make sure to review all operating and installation instructions before commissioning or performing maintenance on the device.

1. Review the relevant certification information for any regulatory requirements. For more information, refer to Section 6.1, “Approvals”.
2. Review the *RUGGEDCOM MX5000RE Modules Catalog [https://support.industry.siemens.com/cs/ca/en/view/109748481]* for special installation or regulatory requirements related to the modules installed in the device.
3. Install the power supply patch cables.
4. If necessary, install the RUGGEDCOM MX5000 chassis ground connection.
5. Connect the failsafe relay and connect the patch cables.
6. Install the fan tray cables.
7. Install the mounting brackets.
8. Install the EMI gaskets.
9. Assemble the RUGGEDCOM MX5000 with the enclosure.
10. Install the fan tray.
11. Install the patch panels.
12. Connect network cables to the patch panels.
13. Install the front panel.
14. Mount the RUGGEDCOM MX5000RE.
15. Connect power to the device and ground the device to safety Earth.
16. Connect the device to the network.

17. Configure the device.

Section 2.2
Unpacking the Device

When unpacking the device, do the following:

1. Inspect the package for damage before opening it.
2. Visually inspect each item in the package for any physical damage.
3. Verify all items are included.

IMPORTANT!
If any item is missing or damaged, contact Siemens for assistance.

Section 2.3
Installing the Power Supply Patch Cables

To connect the power supply patch cables to the enclosure, do the following:

1. Remove the screws from the outer safety cover.

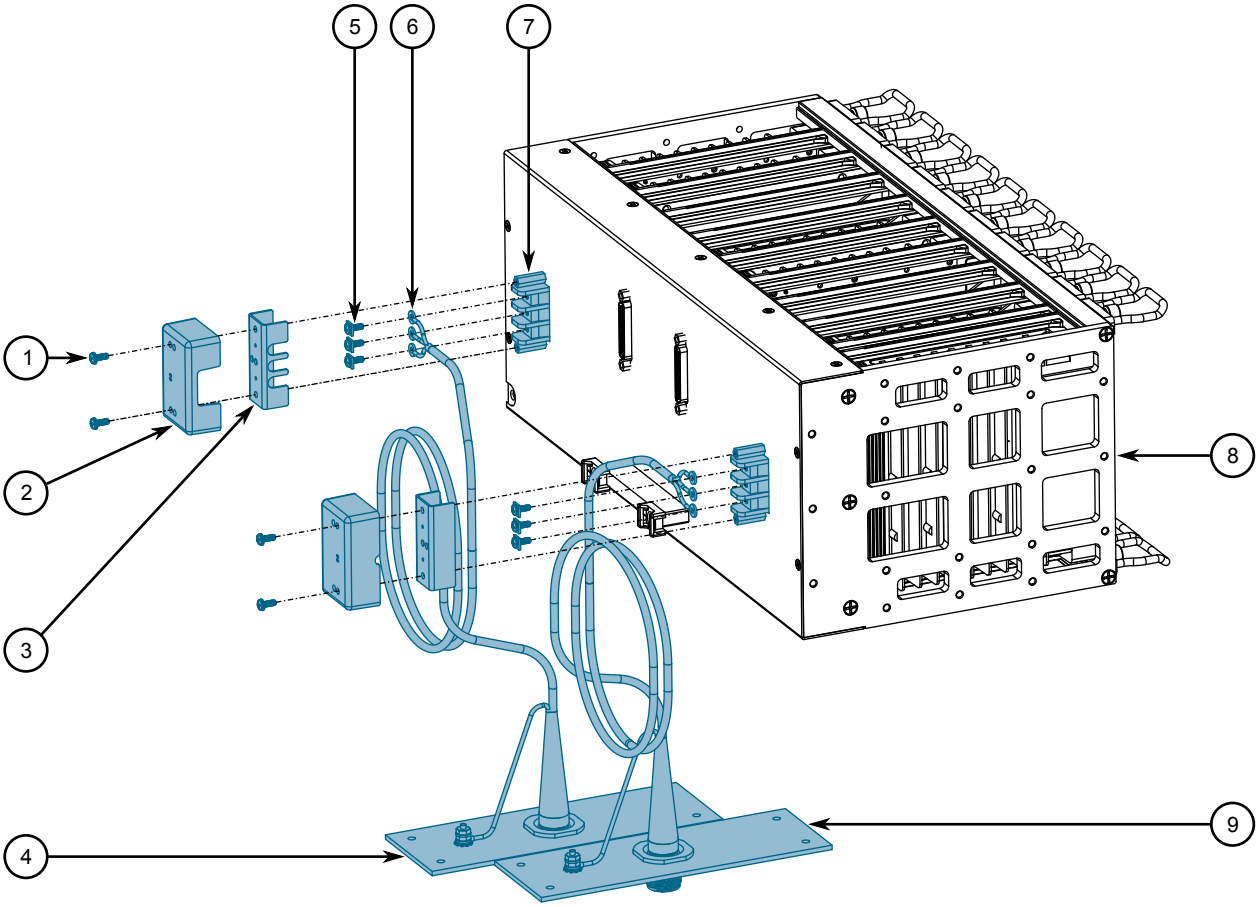


Figure 5: Power Supply Patch Cable Connections

1. #6-32×3/8" Pan Head Screw **2.** Outer Safety Cover **3.** Inner Safety Cover **4.** PS1 Cable Assembly **5.** Terminal Lug Screws **6.** Terminal Ring Lug **7.** Terminal Block **8.** MX5000 **9.** PS2 Cable Assembly

2. Remove the outer safety cover and the inner safety cover from the RUGGEDCOM MX5000.
3. Remove the three terminal lug screws from the terminal block.

DANGER!
Electrocution hazard – risk of death, serious personal injury and/or damage to the device. Make sure the supplied cover is always installed over high voltage screw-type terminal blocks.

CAUTION!
Electrical hazard – risk of damage to equipment. Do not connect AC power cables to a DC power supply terminal block. Damage to the power supply may occur.

4. Connect the live (+/L) lug from the PS1 cable assembly to the live terminal on the PS1 terminal block.

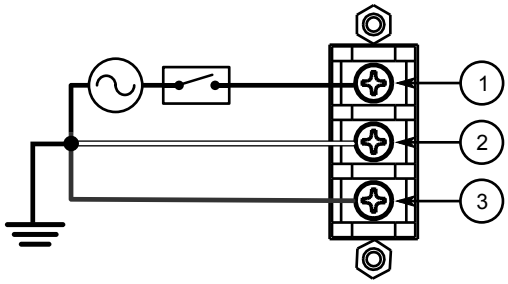


Figure 6: AC Terminal Block Wiring

1. Live Terminal **2.** Ground Terminal **3.** Neutral Terminal

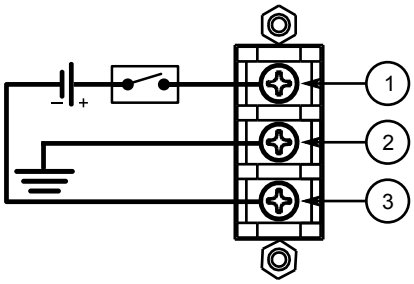


Figure 7: DC Terminal Block Wiring

1. Live Terminal **2.** Ground Terminal **3.** Neutral Terminal

5. Connect the neutral (-/N) lug from the PS1 cable assembly to the neutral terminal on the PS1 terminal block.

IMPORTANT!
If the ground terminals are not connected to safety Earth, the chassis ground connection must be connected. For more information, refer to Section 2.4, "Installing the Chassis Ground Connection".

6. Connect the ground (GND) lug from the PS1 cable assembly to the ground terminal on the PS1 terminal block.
7. If necessary, repeat Step 4 to Step 6 to connect the PS2 cable assembly.
8. Install the inner and outer safety covers, making sure the cables pass through the openings in the sides of the covers.
9. Secure the inner and outer supply safety covers with the screws removed in Step 1.

Section 2.4

Installing the Chassis Ground Connection

If the ground terminal on the power supply module(s) is not connected to safety Earth, a connection must be provided from the chassis ground terminal on the RUGGEDCOM MX5000 chassis.

IMPORTANT!
*If the ground terminal on the power supply module(s) **is** connected to safety Earth, a connection from the chassis ground terminal is not required.*

1. Position the grounding cable and external tooth lock washer on the RUGGEDCOM MX5000.

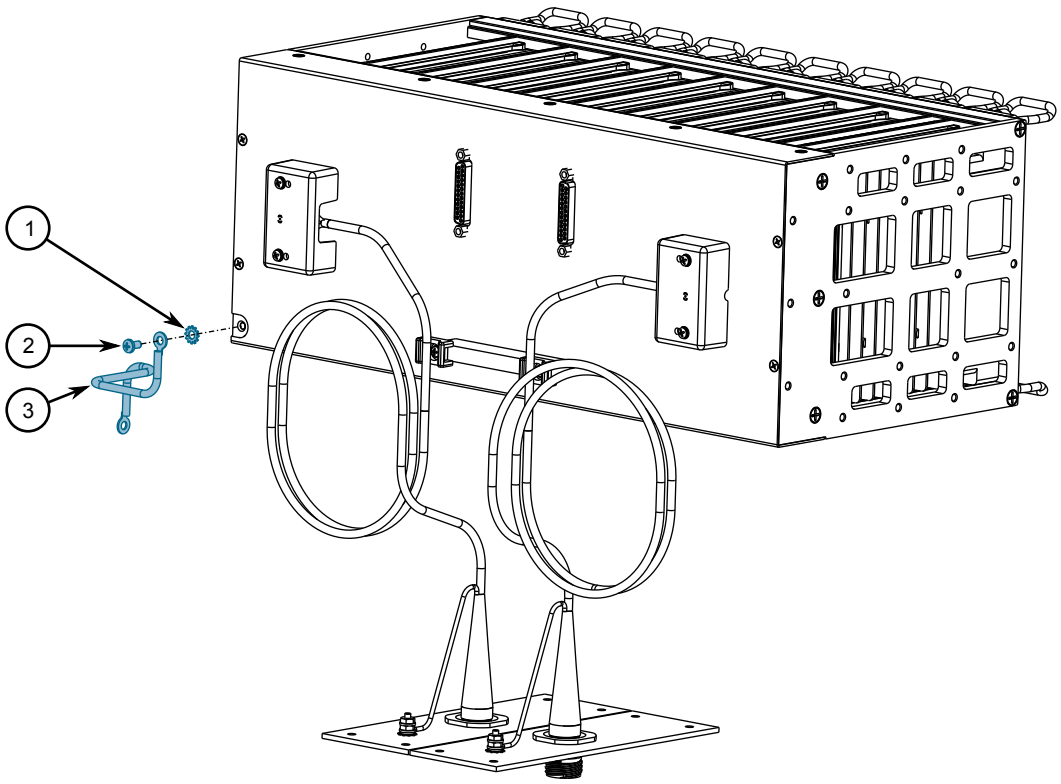


Figure 8: Chassis Ground Cable Assembly

1. External Tooth Lock Washer **2.** #8-32×5/16" Pan Head Screw **3.** Grounding Cable

2. Secure the grounding cable and external tooth lock washer to the RUGGEDCOM MX5000 with one pan head screw. Torque the screw to 3.4 N·m (30 lbf·in).

NOTE
The other end of the grounding cable will be connected to the inside of the enclosure in later steps.

Section 2.5

Connecting the Failsafe Alarm Relay

The failsafe relay on the Control Module (CM) can be configured to latch based on alarm conditions. The NO (Normally Open) contact is closed when the unit is powered and there are no active alarms. If the device is not powered or if an active alarm is configured, the relay opens the NO contact and closes the NC (Normally Closed) contact.

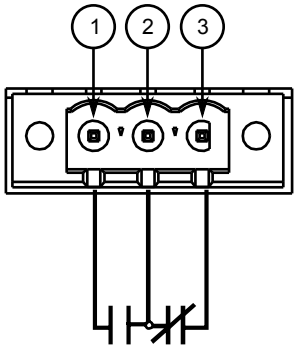


Figure 9: Failsafe Alarm Relay Wiring

1. Normally Open **2.** Common (Ground) **3.** Normally Closed

Pin	Function
NC	Normally Closed
Common	Ground
NO	Normally Open

The failsafe relay terminal is connected to the patch panel for the CM using the cable assembly provided. The connector is an Amphenol MIL-DTL 38999 size 13, code *A*. The following is the pin-out for the connector:

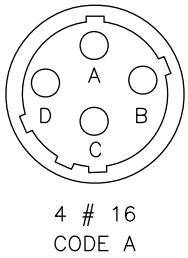


Figure 10: Failsafe Relay Alarm Panel Connector

Pin	Description
A	COM (Common)
B	NO (Normally Open)
C	NC (Normally Closed)
D	Spare

Section 2.6

Installing the Fan Tray Cables

1. Apply Loctite® 222 to the threads of the fan tray cable connector threads.

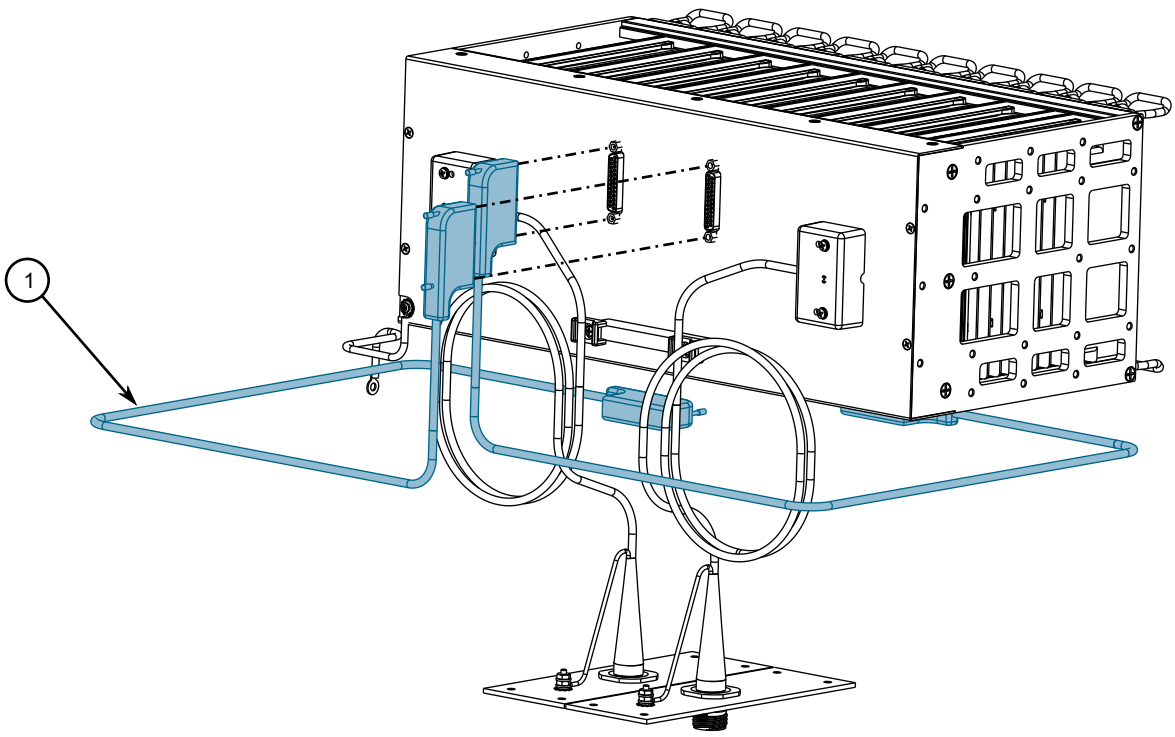


Figure 11: Fan Tray Cable Connections

1. Fan Cables

2. Attach two fan cables to the terminals on the rear of the RUGGEDCOM MX5000.
3. Using two cable ties, secure the fan cables and power cables to the cable tie base on the rear of the RUGGEDCOM MX5000. Make sure the cable ties are snug and the cables are unable to slide freely.

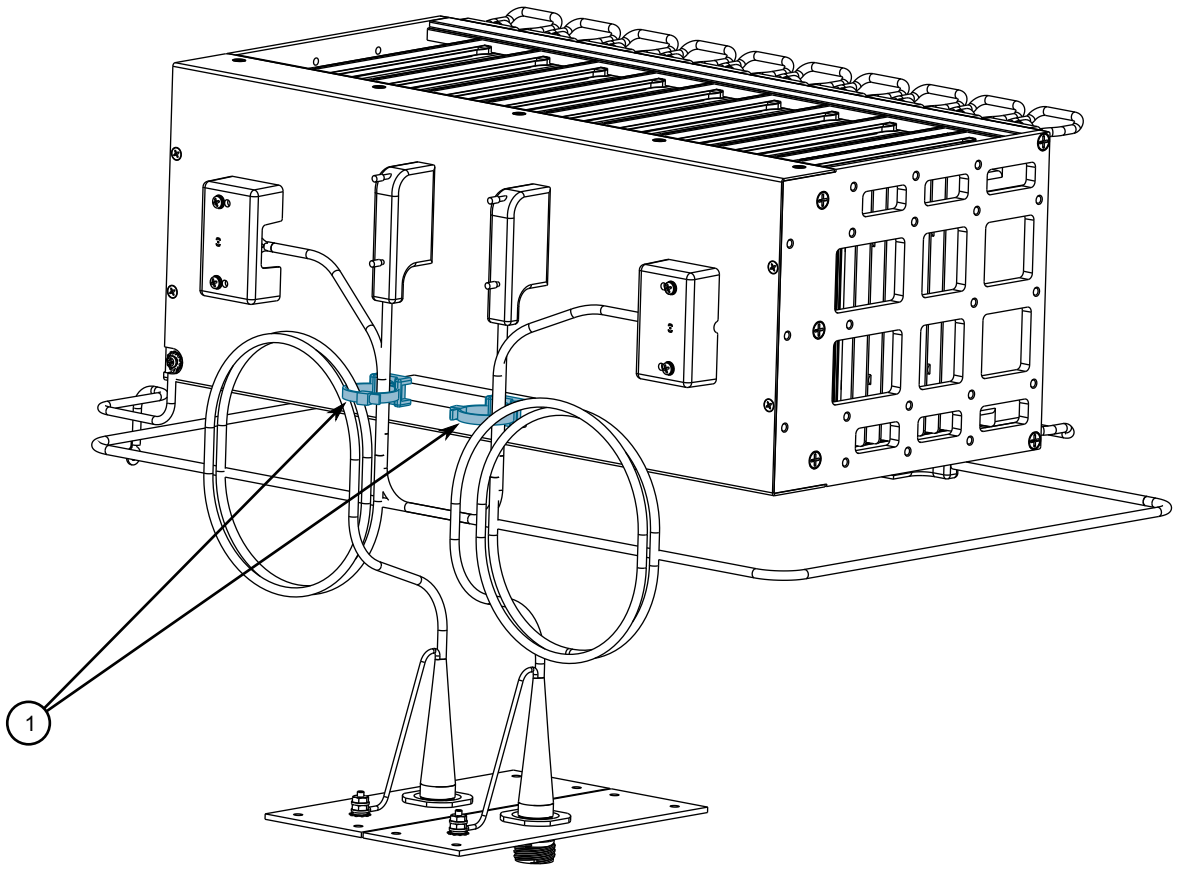


Figure 12: Power and Fan Tray Cable Ties

1. Cable Ties

4. After tightening the cable ties, trim and remove any excess length.

Section 2.7

Installing the Mounting Brackets

1. Position one of the mounting brackets on one side of the RUGGEDCOM MX5000.

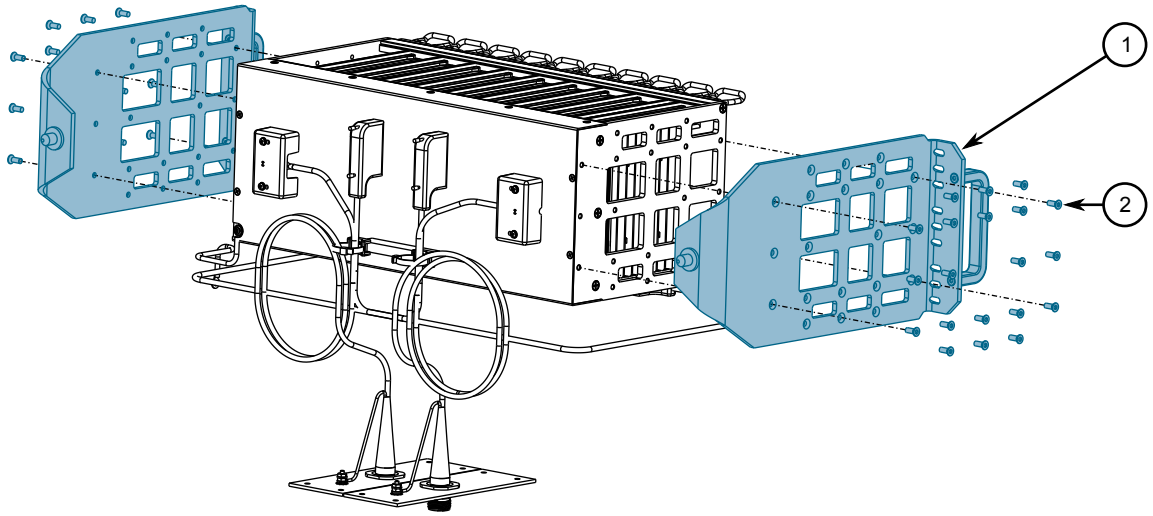


Figure 13: Mounting Brackets

1. Mounting Bracket **2.** #10-32×1/2" Flat Head Hex Socket Screw

2. Secure the mounting bracket with 20 flat head hex socket screws. Hand tighten each screw and make sure each screw head is flush with the surface of the mounting bracket.
3. Repeat Step 1 and Step 2 for the mounting bracket on the opposite side of the RUGGEDCOM MX5000.

Section 2.8

Installing the EMI Gaskets

The material for the EMI (Electro-Magnetic Interference) gaskets is provided in two lengths for the two different sizes of patch panel openings in the RUGGEDCOM MX5000:

EMI Gasket Material Length	Patch Panel Opening
19.5"	D, E, F and G
35.5"	A, B, C, H, J and K

To install the EMI gaskets, do the following:

1. Make sure the groove surrounding each panel opening is free of dust, dirt or liquid.
2. Inspect each gasket for signs of twisting, cracking, wear or damage. If the gaskets need to be replaced, cut and discard the them.

IMPORTANT!

- *Do not stretch the gasket material. Stretching the gasket material will degrade performance. If gasket material is inadvertently stretched, remove it from the patch panel groove and allow it to sit for 8 hours before attempting to install it again. The material will return to its original length.*
- *Do not cut the gasket to length before assembly.*

3. Starting at the overlapping section of a patch panel groove, gently press a length of gasket material into the groove. Work around the groove until the gasket is seated all around the opening and in the overlapping section. Make sure the gasket material is loose and is not stretched during installation.

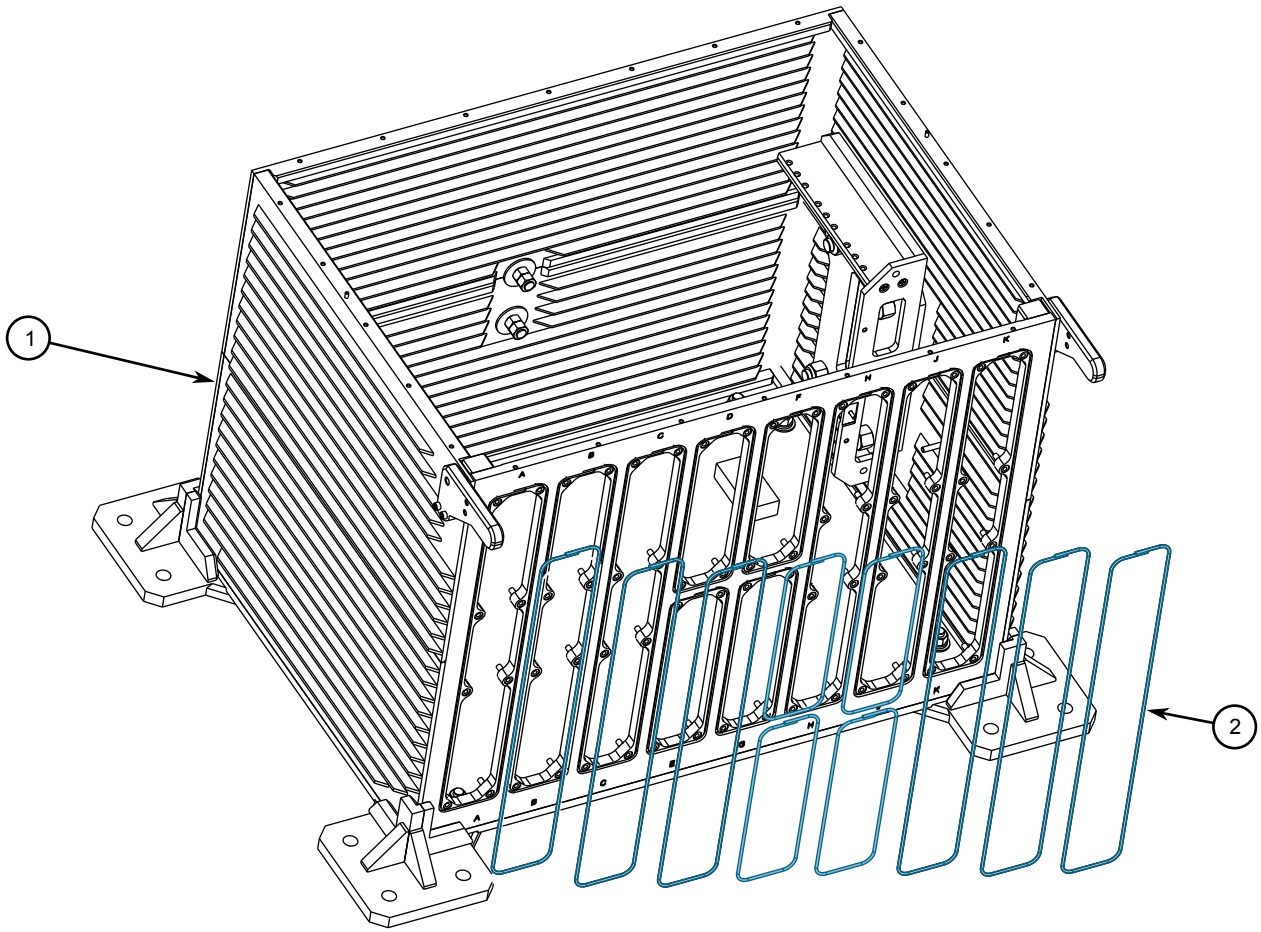


Figure 14: EMI Gasket Installation

4. Trim the gasket material to length.
5. Repeat Step 3 and Step 4 for each patch panel opening.

Section 2.9

Assembling the RUGGEDCOM MX5000 and RUGGEDCOM MX5000RE

To install the RUGGEDCOM MX5000 in the RUGGEDCOM MX5000RE, do the following:

1. Position the RUGGEDCOM MX5000RE with the front opening facing up.

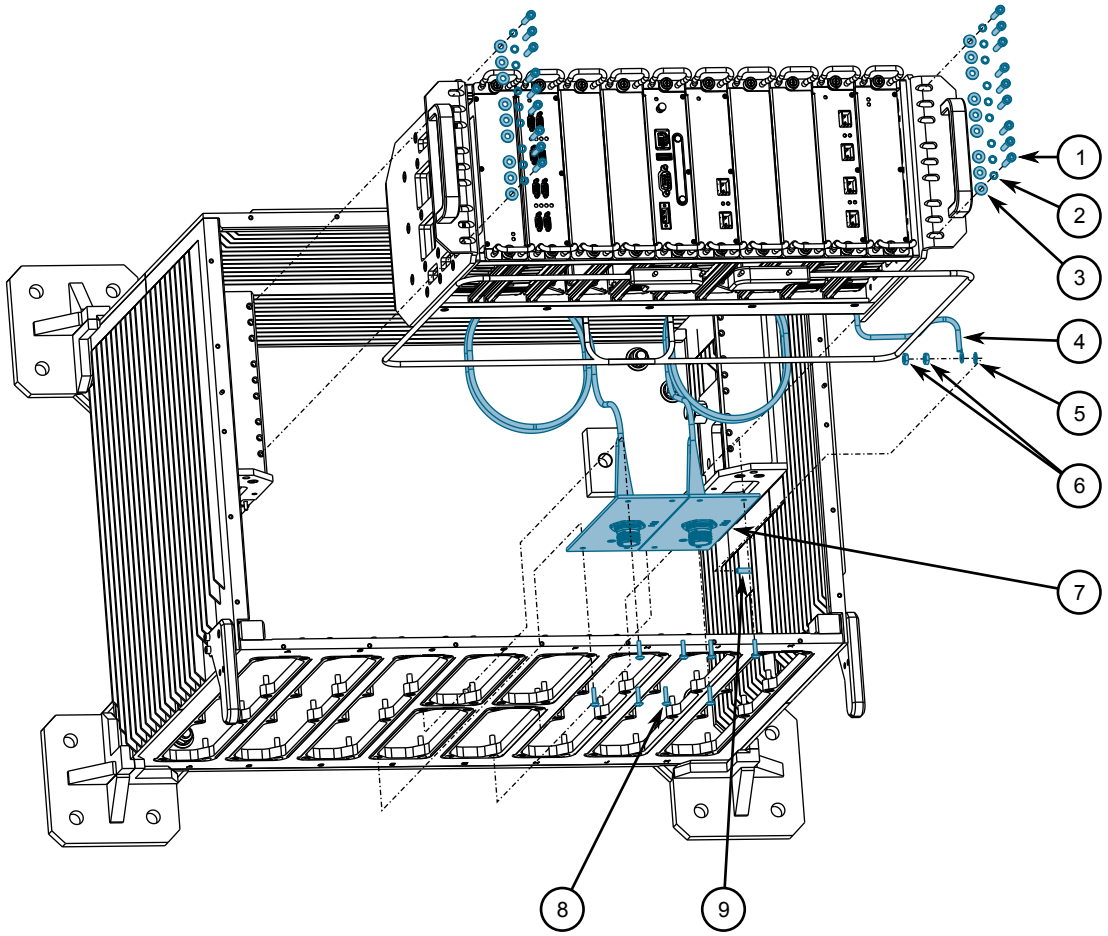


Figure 15: MX5000 and RUGGEDCOM MX5000RE Assembly

1. #10-32×1" Screw **2.** #10 Split Lockwasher **3.** #10 Flat Washers **4.** Grounding Cable **5.** #10 Exterior Tooth Lockwasher **6.** #10-32 Hex Nut **7.** Power Supply Cable Assemblies **8.** #6-32×3/8" SS304 Truss Head Philips Drive Screw **9.** Inside Grounding Stud

WARNING!
Crushing hazard – risk of serious injury or damage to equipment. Make sure the device is properly supported at all times. It is highly recommended to employee the assistance of another technician.

2. Have an assistant hold the attached cables and patch panel clear of the RUGGEDCOM MX5000RE sides.
3. Hold the RUGGEDCOM MX5000 by both mount bracket handles and lower it into the RUGGEDCOM MX5000RE.
4. Lower the RUGGEDCOM MX5000 unit until the mount bracket flanges are supporting the unit on the inner mount bracket surfaces. If the RUGGEDCOM MX5000 does not lower far enough, make sure the support pins on the back of the mount brackets are properly aligned with the alignment holes inside the RUGGEDCOM MX5000RE.
5. Secure the RUGGEDCOM MX5000 to the RUGGEDCOM MX5000RE using 18 screws, flat washers and split lockwashers. Make sure each screw is assembled with two flat washers, one split lockwasher and then the screw.

6. Place one exterior tooth lockwasher on the inside grounding stud found on the right side of the RUGGEDCOM MX5000RE.
7. Attach the free end of the grounding cable to the inside grounding stud using two hex nuts.
8. Carefully pass the PS1 power supply cable assembly through opening E on the bottom of the RUGGEDCOM MX5000RE.
9. Carefully pass the PS2 power supply cable assembly through opening G on the bottom of the RUGGEDCOM MX5000RE.

> **NOTE**
> *When aligning the patch panels, the inside grounding stud should be toward the back of the RUGGEDCOM MX5000RE.*

10. Apply Loctite® 242 to four SS304 truss head philips drive screws.
11. Secure both patch panels to the RUGGEDCOM MX5000RE with four SS304 truss head philips drive screws.

Section 2.10

Installing the Fan Tray

To intall the fan tray, do the following:

1. Position the fan tray the DB25 connectors facing forward when the fan tray is in the RUGGEDCOM MX5000RE.

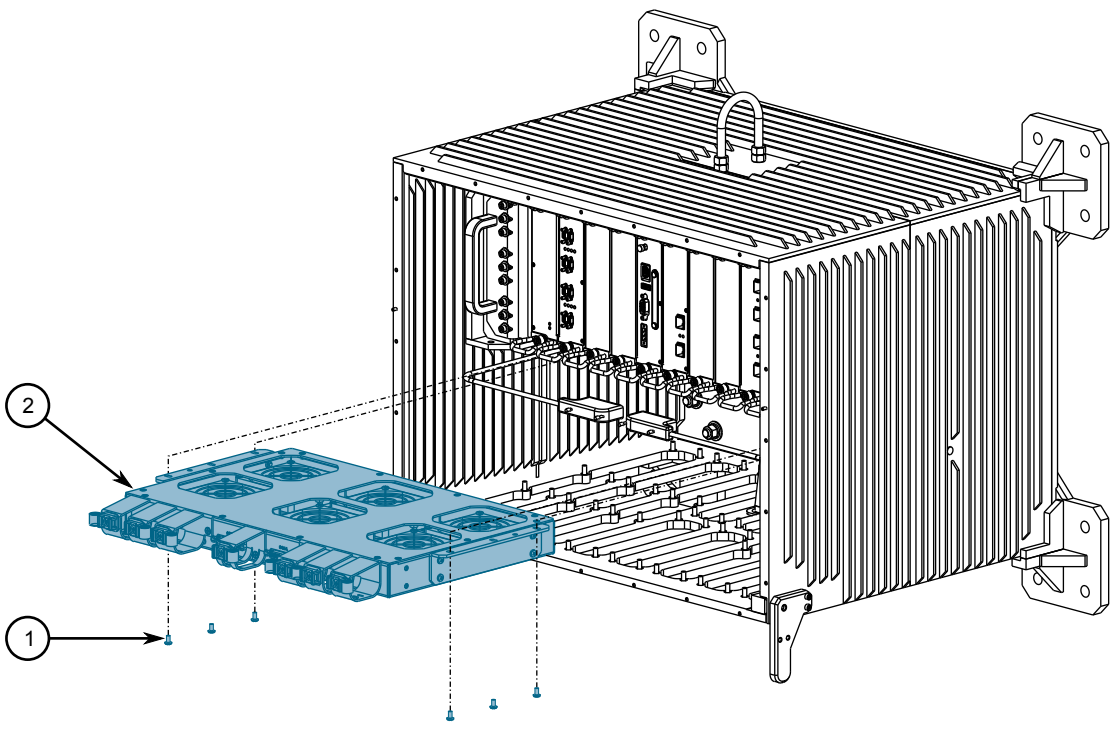


Figure 16: Fan Tray Installation

1. #8-32×5/16" Pan Head Screw **2.** Fan Tray

2. Align the fan tray with the pins on the bottom of the internal mounting brackets inside the RUGGEDCOM MX5000RE.
3. Slide the fan tray onto the locating pins until the fan tray mount brackets touch the RUGGEDCOM MX5000RE inner mount brackets.
4. Secure the fan tray using six (6) screws. Use Loctite® 242 on all screws.
5. Take the free ends of the fan control cables and straighten the cables side by side.
6. Take the right side fan control cable and thread it through the three (3) loops on the left side of the fan tray.
7. Connect the fan control cable to the left side DB25 connector.
8. Repeat Step 6 and Step 7 using the left side fan control cable.
9. Apply Loctite® 222 on the DB25 plug screws. Tighten the DB25 connector screws moderately.

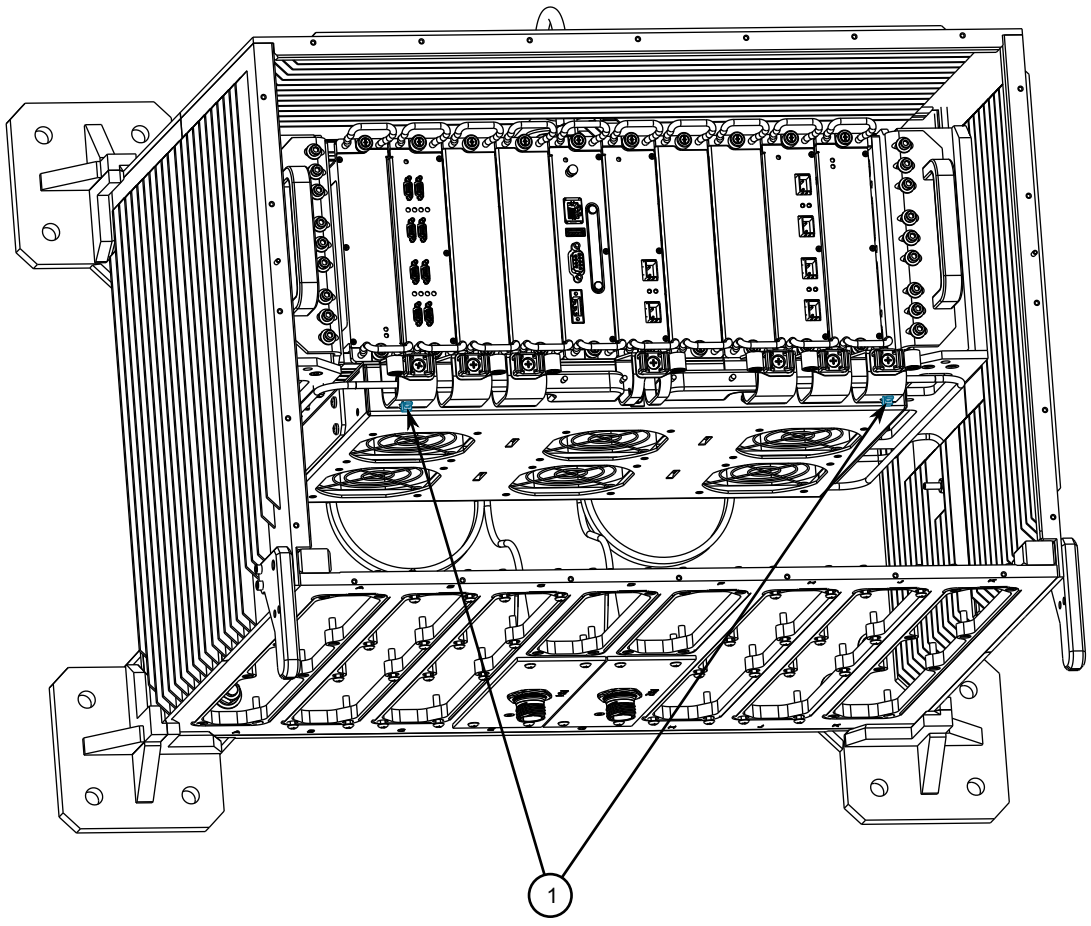


Figure 17: Fan Tray Cable Clips

1. Cable Clip

10. Secure the cables using two (2) cable ties through the slots on the outermost cable clips on the fan tray. Make sure the cables are held snug and are unable to slide freely.
11. After tightening the cable ties, trim and remove any excess length.

Section 2.11

Installing the Patch Panels

To install a patch panel, do the following:

NOTE
The following procedure also applies for blank patch panels.

1. From the bottom of the enclosure, feed the patch panel cables through the appropriate opening. For more information about which patch panels correspond to which openings, refer to Section 1.5, "Patch Panels".

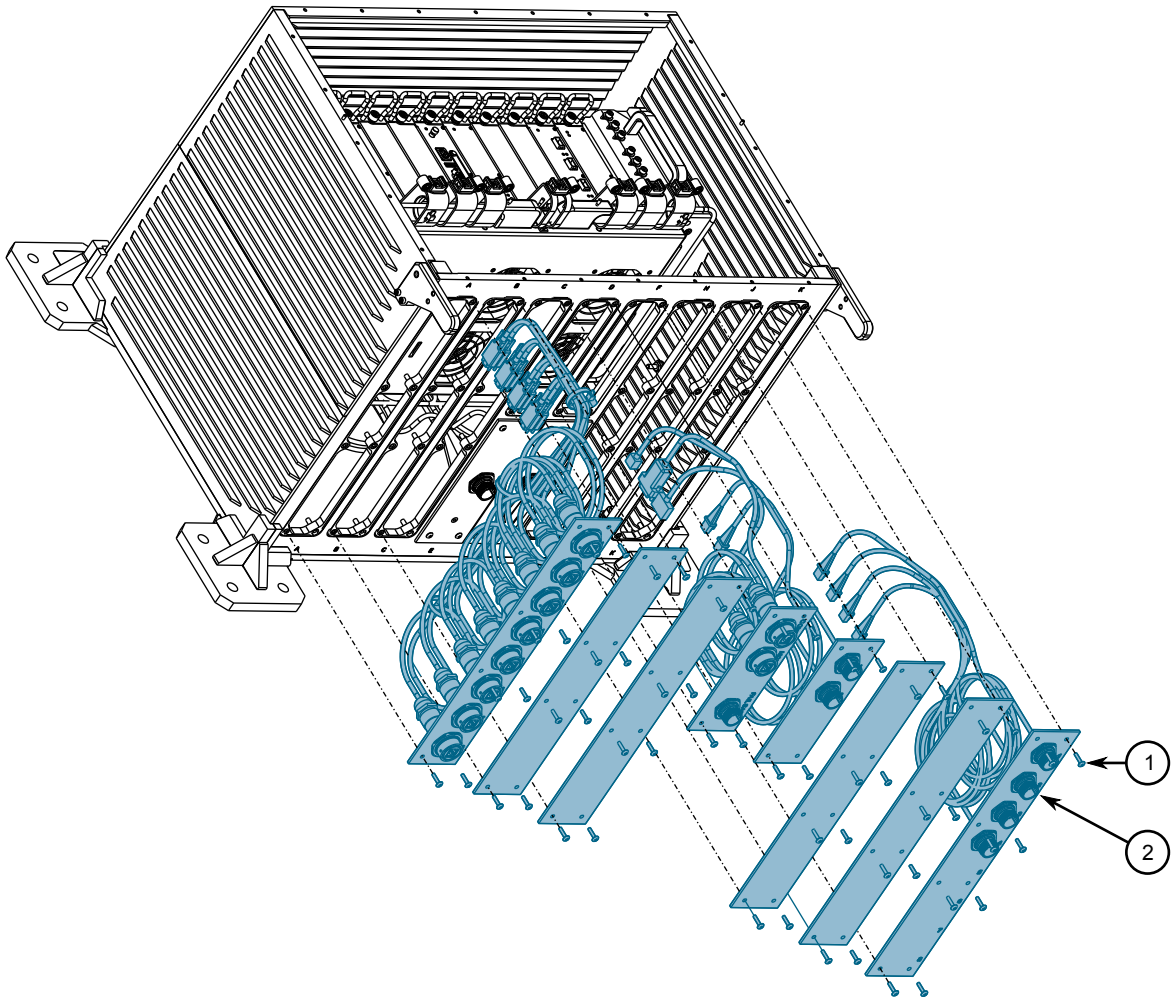


Figure 18: Patch Panel Installation

1. #6-32×5/8" SS304 Truss Head Philips Drive Screw **2.** Patch Panel

2. Align the patch panel with the screw holes surrounding the patch panel opening.
3. Apply Loctite® 242 to each screw.
4. Secure the patch panel to the enclosure with eight (8) screws for large panels, or four (4) for small panels. Hand-tighten the screws evenly in a cross pattern. There should be no visible gap between the patch panel

and the enclosure's bottom plate when properly tightened. Pay careful attention to avoid damaging the cables and gaskets.

Section 2.12
Connecting the Network Cables

To connect network cables to the patch panels, do the following for each patch panel:

» Connecting Micro-D Cables

1. Connect each cable in the patch panel bundle to the appropriate port. Make sure the cable and port have identical numbers.
2. Secure the bundled cables to an available cable tie base using one (1) cable tie. Tighten the cable tie until the bundled cables are held securely.
3. Install additional cable ties where necessary.

» Connecting Ethernet Cables

1. Carefully remove the dust caps from one connector at a time.
2. Insert the uncapped connector into the appropriate transceiver on the RUGGEDCOM MX5000. Make sure the cable and port have the same number, and the transmit and receive fibers are plugged in to the correct side of the transceiver.
3. Repeat Step 1 and Step 2 for all remaining fiber cables.
4. Secure all fiber cables with the provided Velcro® straps. Wrap the Velcro® cable strap around the fiber cables tightly, making sure the fiber cables are held securely.

Section 2.13
Installing the Front Panel

To install the front panel for the RUGGEDCOM MX5000RE, do the following:

1. Position the RUGGEDCOM MX5000RE with the front opening facing up.

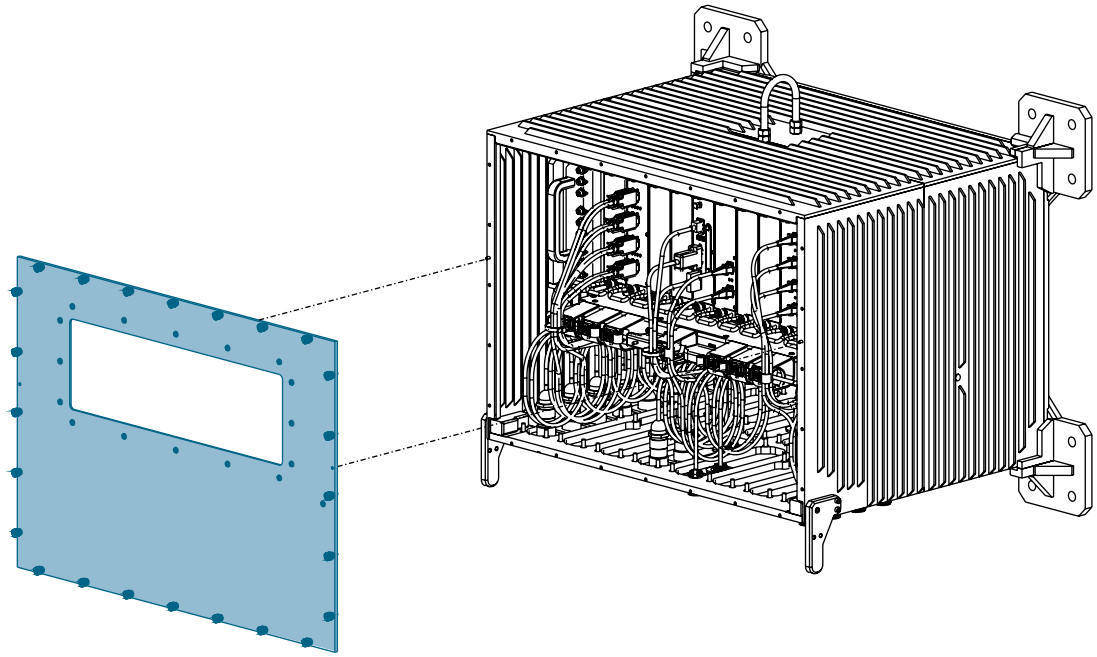


Figure 19: Front Panel Installation

WARNING!
Crushing hazard – risk of serious injury or damage to equipment. Make sure the front panel is properly supported at all times. It is highly recommended to employee the assistance of another technician.

2. Position the front panel over the RUGGEDCOM MX5000RE opening, aligning the panel with the two (2) locating pins on the front face.
3. Secure the front panel with 24 screws. Hand-tighten the screws evenly in a cross pattern.

Section 2.14

Mounting the RUGGEDCOM MX5000RE

To mount the fully assembled RUGGEDCOM MX5000RE to its final mounting surface, do the following:

1. Make sure the mounting surface is flat within a tolerance of 0.254 mm (0.010 in).
2. Position the enclosure with the lifting ring facing up.

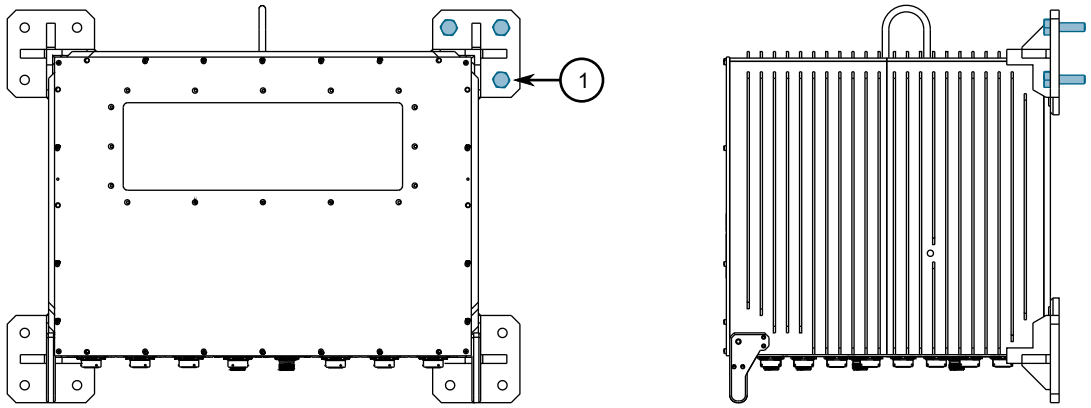


Figure 20: Mounting the RUGGEDCOM MX5000RE

1. Screw

WARNING!
Crushing hazard – risk of serious injury or damage to equipment. Make sure the front panel is properly supported at all times. It is highly recommended to employee the assistance of another technician.

3. Secure the RUGGEDCOM MX5000RE to a wall or mounting bracket using screws. Torque each screw evenly to 61 N·m (45 lbf·ft) in a cross pattern.

Section 2.15
Connecting Power

The RUGGEDCOM MX5000RE supports dual redundant AC and/or DC power modules that can be installed in any combination.

The MX5000 is equipped with a screw-type terminal block, which provides power to both power modules. The terminal block is installed using Philips screws and compression plates, allowing either bare wire connections or crimped terminal lugs. Use #6 size ring lugs for secure, reliable connections under severe shock or vibration.

For information about installing or removing a power module, refer to Section 4.3, "Installing/Removing Power Supply Modules".

DANGER!
Electrocution hazard – risk of serious personal injury or death. The device may have two power modules equipped, which may be connected to separate power sources. Make sure all power sources are off before servicing the power module terminals.

IMPORTANT!

- *In an AC/DC power arrangement, the placement of the AC and DC power modules is not slot-dependent. Either power module slot can be used for AC or DC power.*
- *For maximum redundancy in a dual power module configuration, use two independent power sources.*

- *Use minimum #16 gage copper wiring when connecting terminal blocks.*
- *For 125/230 VAC rated equipment, an appropriately rated AC circuit breaker must be installed.*
- *For 125/250 VDC rated equipment, an appropriately rated DC circuit breaker must be installed.*
- *It is recommended to provide a separate circuit breaker for each power module module.*
- *Equipment must be installed according to applicable local wiring codes and standards.*

CONTENTS

Section 2.15.1

Connecting Power to the Enclosure

To complete the power circuit, connect an external power supply to the PS1 and/or PS2 patch panels using male Amphenol MIL-DTL 389999 size 13, code N connectors.

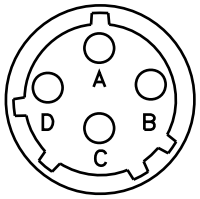


Figure 21: Power Supply Panel Connector

Pin	Description
A	PS LIve/+
B	Spare
C	PS Neutral/-
D	Spare

3 Device Management

This section describes how to connect to and manage the device.

CONTENTS

Section 3.1

Connecting to the Device

The following describes the various methods for accessing the RUGGEDCOM ROX II console and Web interfaces on the device. For more detailed instructions, refer to the *RUGGEDCOM ROX II User Guide* for the RUGGEDCOM MX5000RE.

» Serial Console and Management Ports

Connect a PC or terminal directly to the serial console or management ports to access the boot-time control and ROX II interfaces. The serial console port provides access to ROX II's console interface, while the management port provides access to ROX II's console and Web interfaces.

IMPORTANT!
The serial console and management (MGMT) ports are intended to be used only as temporary connections during initial configuration or troubleshooting.

The serial console port implements RS232 DCE (Data Communication Equipment) on a DB9 connector. The following is the pin-out for the port:

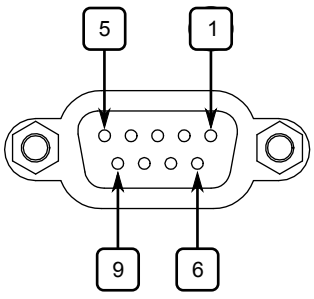


Figure 22: Serial DB9 Console Port

Pin	Name	Description
1	DCD	Data Carrier Detect
2	RX	Receive Data
3	TX	Transmit Data
4	DTR	Data Terminal Ready
5	GND	Signal Ground
6	DSR	Data Set Ready
7	RTS	Request to Send
8	CTS	Clear To Send

Pin	Name	Description
9	Reserved (Do Not Connect)	

The management port is a 10/100Base-TX copper Ethernet port with an RJ45 connector. The following is the pin-out for the management port:

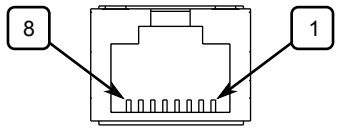


Figure 23: RJ45 Management Port

Pin	Name	Description
1	TX+	Transmit Data+
2	TX-	Transmit Data-
3	RX+	Receive Data+
4	Reserved (Do Not Connect)	
5	Reserved (Do Not Connect)	
6	RX-	Receive Data-
7	Reserved (Do Not Connect)	
8	Reserved (Do Not Connect)	

Communication Ports

Connect any of the available Ethernet ports on the device to a management switch and access the RUGGEDCOM ROX II console and Web interfaces via the device's IP address. The factory default IP address for the RUGGEDCOM MX5000RE is https://192.168.0.2.

For more information about available ports, refer to Chapter 4, *Modules*.

Section 3.2

Configuring the Device

Once the device is installed and connected to the network, it must be configured. All configuration management is done via the RUGGEDCOM ROX II interface. For more information about configuring the device, refer to the *RUGGEDCOM ROX II User Guide* associated with the installed software release.

Section 3.3

Accessing the CompactFlash Card

The RUGGEDCOM MX5000RE features a removable CompactFlash (CF) card that stores configuration files, firmware (active and backup versions), file-based feature keys and other system files.

CAUTION!
Configuration hazard – risk of data corruption/loss. Do not remove or insert the CF card when the device is powered on.

The CF card should only be removed in the following scenarios:

- The chassis is defective (with the exception of power and media modules)

- The CF card is deemed defective or corrupt
- The device is rendered non-functional due to a serious configuration error, data corruption, or hardware fault

CAUTION!
Configuration hazard – risk of data corruption/loss. The following will void the warranty and potentially result in configuration data corruption/loss:

- *Using a CF card not approved by Siemens for use with this device*
- *Removing the CF card in any scenario other than those described in this section*

Inserting the CF card

To insert the CF card into the device, do the following:

IMPORTANT!
The device should only be powered on when the CF card is present.

1. Make sure the device is powered down.
2. Remove the CF card access panel.
3. Insert the CF card into the slot until it is fully seated.

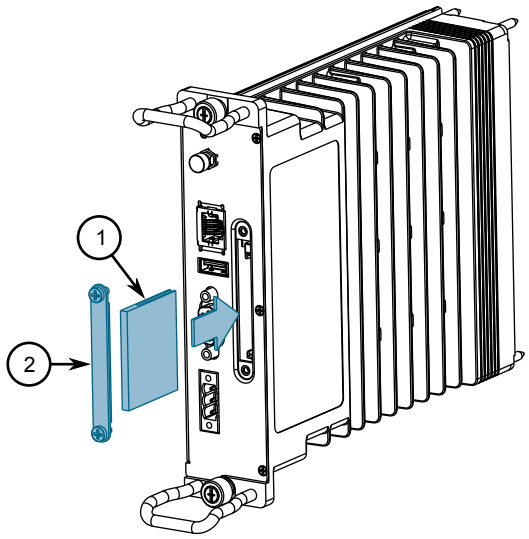


Figure 24: Inserting the CF Card

1. CompactFlash Card **2.** Access Panel

4. Secure the CF card access panel to the chassis.

Removing the CF card

To remove the CF card from the device, do the following:

1. Make sure the device is powered down.
2. Remove the CF card access panel.

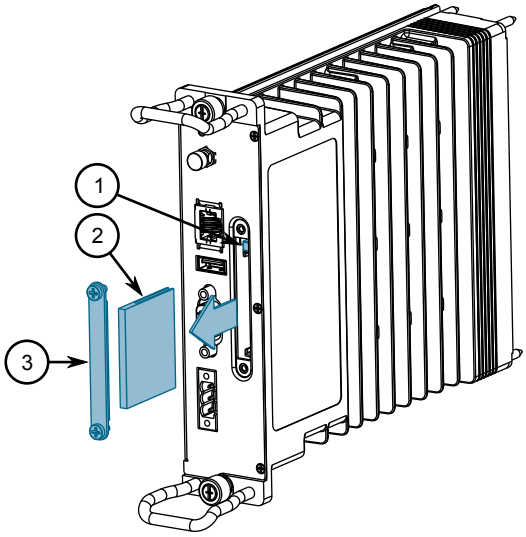


Figure 25: Removing the CF Card

1. Ejector Button **2.** CompactFlash Card **3.** Access Panel

3. Press the ejector button to the left of the CF card and then pull the card out.
4. Secure the CF card access panel to the chassis.

4 Modules

The RUGGEDCOM RUGGEDCOM MX5000 features slots for up to two power modules and eight line modules, which can be used to expand and customize the capabilities of the device to suit specific applications. A variety of modules are available, each featuring a specific type of communication port: copper Ethernet, fiber optic Ethernet, SFP or serial.

Two slots are reserved for one control module (required) and one switch module (optional).

All modules are field-replaceable.

Use the RUGGEDCOM ROX II software to determine which ports are equipped on the device. For more information, refer to the *RUGGEDCOM ROX II User Guide* for the device.

NOTE
Switch modules are only compatible with 8-port fiber optic Ethernet modules.

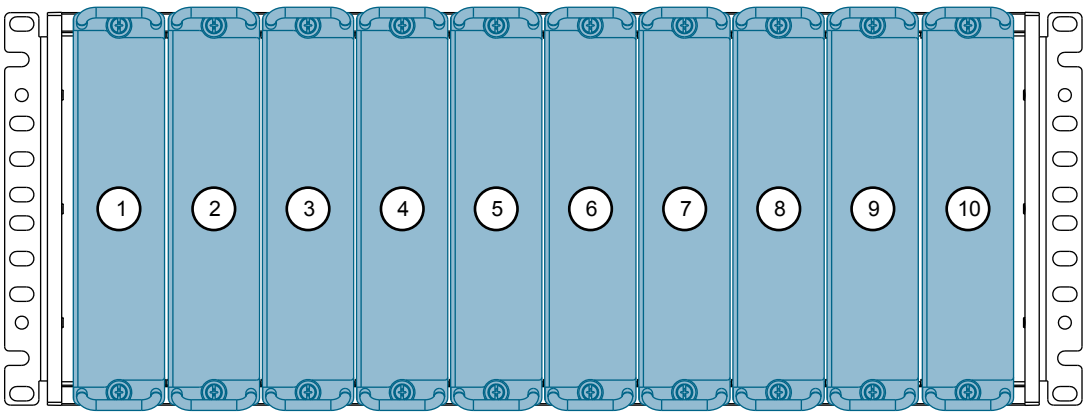


Figure 26: Available Chassis Slots

1. Power Supply Module (PS1) **2.** Ethernet Module Slot (LM1) **3.** Ethernet Module Slot (LM2) **4.** Ethernet Module Slot (LM3) **5.** Control Module (CM) **6.** Switch Module (SM) **7.** Ethernet Module Slot (LM4) **8.** Ethernet Module Slot (LM5) **9.** Ethernet Module Slot (LM6) **10.** Power Supply Module (PS2)

CONTENTS

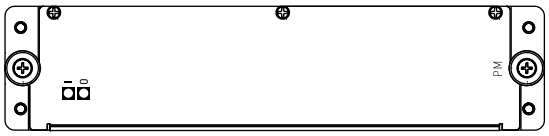
Section 4.1

Available Modules

The following is a list of all power and line modules available for use in the RUGGEDCOM MX5000RE. For more information about individual modules, refer to the *RUGGEDCOM MX5000RE Modules Catalog* [https://support.industry.siemens.com/cs/ca/en/view/109748780].

Power Supply Modules

RUGGEDCOM MX5000REPN PS MHIF



Specifications

Input Range: 88 to 300 VDC or 85 to 264 VAC

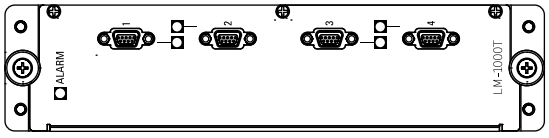
Terminal Type: Terminal located on chassis

Article Numbers

6GK6050-0RL16-0AA1

Copper Ethernet Modules

RUGGEDCOM MX5000REPN LM M4CG02



Specifications

Ports: 4

Speed: 1000 Mbps

Interface: TX

Connector: Micro-D

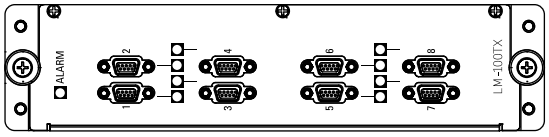
Article Numbers

6GK6050-0ML20-0FD1 (Module)

6GK6050-0RL20-0FD1 (Module with Patch Panel and Cables)

6GK6050-0AR00-4RD0 (Patch Panel and Cables)

RUGGEDCOM MX5000REPN LM M8TX02



Specifications

Ports: 8

Speed: 100 Mbps

Interface: TX

Connector: Micro-D

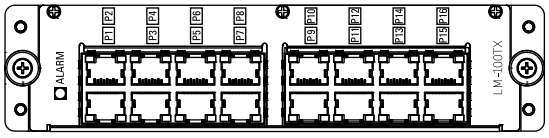
Article Numbers

6GK6050-0ML20-0ND1 (Module)

6GK6050-0RL20-0ND1 (Module with Patch Panel and Cables)

6GK6050-0AR00-8RD0 (Patch Panel and Cables)

RUGGEDCOM MX5000REPN LM M12TX01



Specifications

Ports: 12

Speed: 100 Mbps

Interface: TX

Connector: RJ45

Article Numbers

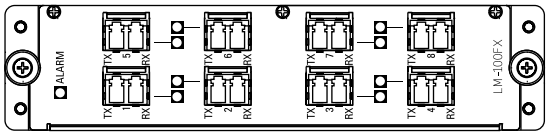
6GK6050-0ML20-0NB1 (Module)

6GK6050-0RL20-0NE1 (Module with Patch Panel and Cables)

6GK6050-0AR00-6RR0 (Patch Panel and Cables)

Fiber Optic Ethernet Modules

RUGGEDCOM MX5000REPN LM M8FX11



Specifications

Mode: MM

Speed: 100 Mbps

Interface: FX

Ports: 8

Connector: LC

Distance: 2 km (1.2 mi)

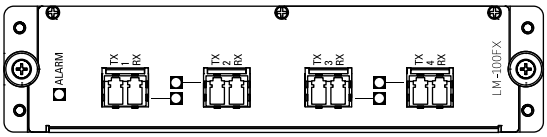
Article Numbers

6GK6050-0ML20-0BD1 (Module)

6GK6050-0RL20-0BD1 (Module with Patch Panel and Cables)

6GK6050-0AR00-8MM0 (Patch Panel and Cables)

RUGGEDCOM MX5000REPN LM M4FX11



Specifications

Mode: MM

Speed: 100 Mbps

Interface: FX

Ports: 4

Connector: LC

Distance: 2 km (1.2 mi)

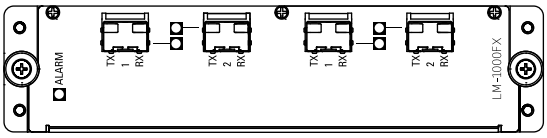
Article Numbers

6GK6050-0ML20-0BH1 (Module)

6GK6050-0RL20-0BH1 (Module with Patch Panel and Cables)

6GK6050-0AR00-4MM0 (Patch Panel and Cables)

RUGGEDCOM MX5000REPN LM M4FG01



Specifications

Mode: MM

Speed: 1000 Mbps

Interface: SX

Wavelength: 850 nm

Ports: 4

Connector: LC

Distance: 500 m (1640 ft)

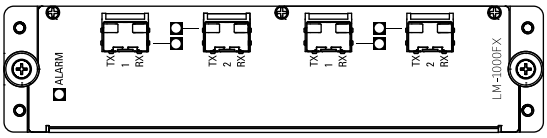
Article Numbers

6GK6050-0ML20-0BK1 (Module)

6GK6050-0RL20-0BK1 (Module with Patch Panel and Cables)

6GK6050-0AR00-4MM0 (Patch Panel and Cables)

RUGGEDCOM MX5000REPN LM M4FG03



Specifications

Mode: SM

Speed: 1000 Mbps

Interface: LX

Wavelength: 1310 nm

Ports: 4

Connector: LC

Distance: 10 Km (6 mi)

Article Numbers

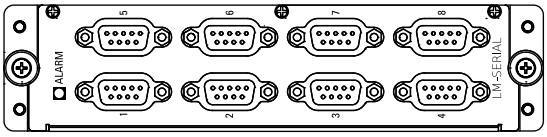
6GK6050-0ML20-0CR1 (Module)

6GK6050-0RL20-0CR1 (Module with Patch Panel and Cables)

6GK6050-0AR00-4SM0 (Patch Panel and Cables)

» Serial Modules

RUGGEDCOM MX5000REPN LM MS01



Specifications

Standard: RS232/RS422/RS485

Ports: 8

Connector: DB9

Article Numbers

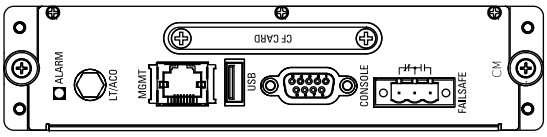
6GK6050-0ML20-0KB1 (Module)

6GK6050-0RL20-0KB1 (Module with Patch Panel and Cables)

6GK6050-0AR00-8DR0 (Patch Panel and Cables)

» Control Modules

RUGGEDCOM MX5000REPN MCM01 L3SEL3HW



Specifications

Layer 3 Standard Edition, Layer 3 Hardware

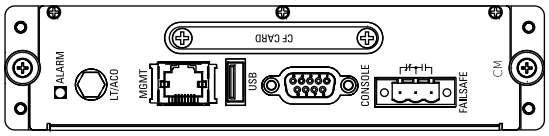
Article Numbers

6GK6050-0ML30-0BA1 (Module)

6GK6050-0RL30-0BA1 (Module with Patch Panel and Cables)

6GK6050-0AR00-1CP0 (Patch Panel and Cables)

RUGGEDCOM MX5000REPN MCM01 L3SECL3HW



Specifications

Layer 3 Security Edition, Layer 3 Hardware

Article Numbers

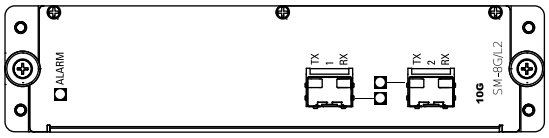
6GK6050-0ML30-0CA1 (Module)

6GK6050-0RL30-0CA1 (Module with Patch Panel and Cables)

6GK6050-0AR00-1CP0 (Patch Panel and Cables)

Switch Modules

RUGGEDCOM MX5000REPN MSM36



Specifications

Mode: SM

Speed: 1000 Mbps

Interface: LX

Wavelength: 1310 nm

Ports: 2

Connector: LC

Distance: 10 Km (6 mi)

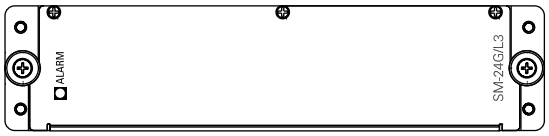
Article Numbers

6GK6050-0ML40-0RA1 (Module)

6GK6050-0RL40-0RA1 (Module with Patch Panel and Cables)

6GK6050-0AR00-1SP0 (Patch Panel and Cables)

RUGGEDCOM MX5000REPN MSM61



Specifications

Layer 3

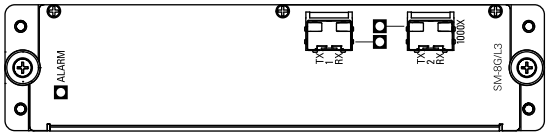
Article Numbers

6GK6050-0ML40-0VA1 (Module)

6GK6050-0RL40-0VA1 (Module with Patch Panel and Cables)

6GK6050-0AR00-0XF0 (Patch Panel and Cables)

RUGGEDCOM MX5000REPN MSM70



Specifications

Mode: SM

Speed: 10 Gbps

Interface: LR

Wavelength: 1310nm

Ports: 2

Connector: LC

Distance: 10km (6mi)

Article Numbers

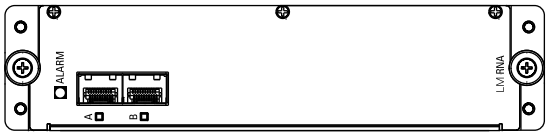
6GK6050-0ML40-0XA1 (Module)

6GK6050-0RL40-0WA1 (Module with Patch Panel and Cables)

6GK6050-0AR00-1SP0 (Patch Panel and Cables)

Network Redundancy Modules

RUGGEDCOM MX5000REPN LM MPRP



Specifications

Ports: 2

Speed: 1000 Mbps

Interface: LX

Port Type: RJ45

Distance: 10 km (6.2 mi)

Protocol: PRP

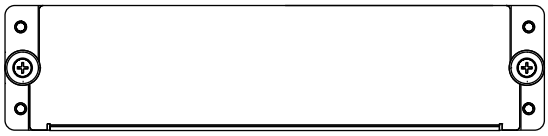
Article Numbers

6GK6050-0ML20-0PR1 (Module)

6GK6050-0RL20-0PR1 (Module with Patch Panel and Cables)

6GK6050-0AR00-2PR0 (Patch Panel and Cables)

Blank Modules

RUGGEDCOM MX5000REPN PS XX	Specifications	Article Numbers
	Blank power supply module, full panel	6GK6050-0RL10-0AA1

RUGGEDCOM MX5000REPN LM XX	Specifications	Article Numbers
	Blank line module, half panel	6GK6050-0RL20-0AA1

Section 4.2

Installing/Removing Line Modules

Upon installing a new line module in the device, all features associated with the module are available in RUGGEDCOM ROX II. For more information, refer to the *RUGGEDCOM ROX II User Guide* for the RUGGEDCOM MX5000RE.

Once a line module is removed, all the features associated with the module are hidden or disabled in RUGGEDCOM ROX II.

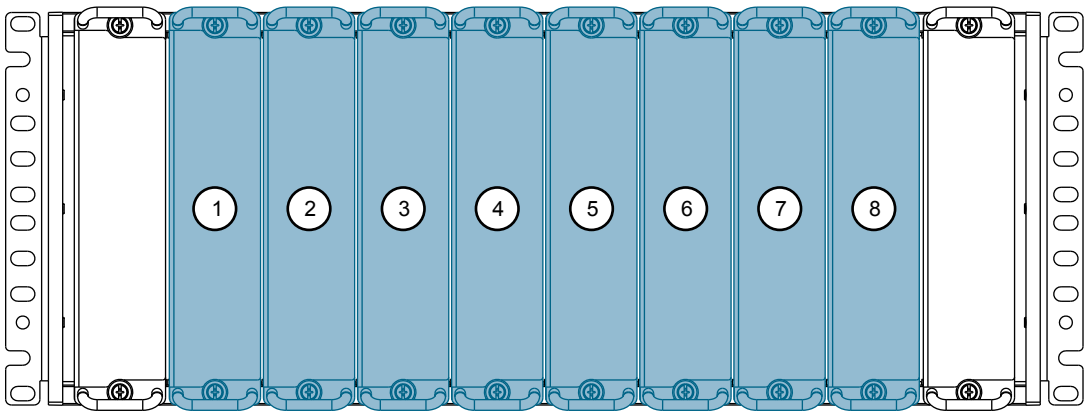


Figure 27: Line Modules

1. Ethernet Module Slot (LM1) **2.** Ethernet Module Slot (LM2) **3.** Ethernet Module Slot (LM3) **4.** Control Module (CM) **5.** Switch Module (SM) **6.** Ethernet Module Slot (LM4) **7.** Ethernet Module Slot (LM5) **8.** Ethernet Module Slot (LM6)

CAUTION!
Contamination hazard – risk of equipment damage. Prevent the ingress of water, dirts and other debris that may lead to premature equipment failure. Always make sure slots are not left empty and open ports are protected with plugs or covers.

NOTE
Control and switch modules are not hot swappable. Power to the device must be disconnected before removing these modules.

Removing a Line Module

To remove a line module, do the following:

1. For Control and switch modules only, make sure power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.
2. [Optional] If the device is installed in a rack, remove it from the rack.
3. Loosen the screws that secure the module.
4. Pull the module from the chassis to disconnect it.

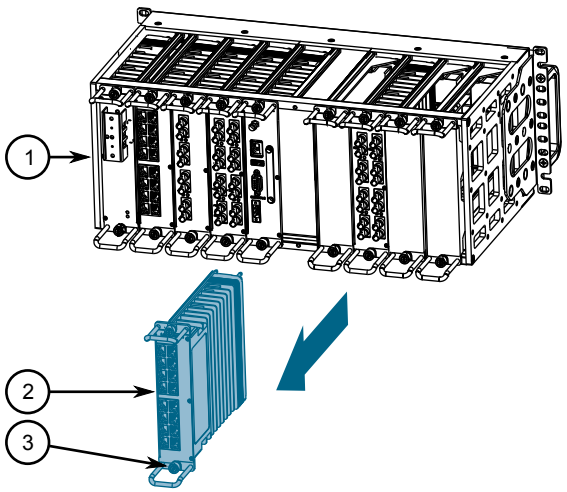


Figure 28: Removing a Module

1. Chassis **2.** Module **3.** Screw

5. Install a new module or a blank module (to prevent the ingress of dust and dirt).
6. [Optional] If necessary, install the device in the rack.
7. For control and switch modules only, connect power to the device.

Installing a Line Module

To install a line module, do the following:

1. For Control and switch modules only, make sure power to the device has been disconnected and wait approximately two minutes for any remaining energy to dissipate.
2. [Optional] If the device is installed in a rack, remove it from the rack.
3. Remove the current module from the slot.
4. Insert the new module into the slot.

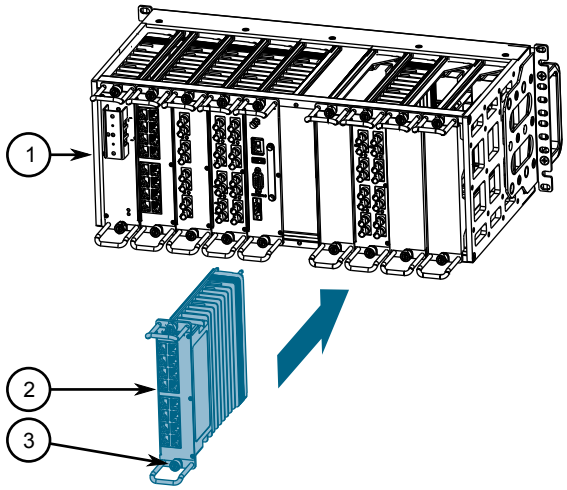


Figure 29: Installing a Module

1. Chassis **2.** Module **3.** Screw

5. Tighten the screws to secure the module.
6. [Optional] If necessary, install the device in the rack.
7. For control and switch modules only, connect power to the device.

Section 4.3

Installing/Removing Power Supply Modules

The RUGGEDCOM MX5000 supports dual redundant power supplies that can be installed in any combination.

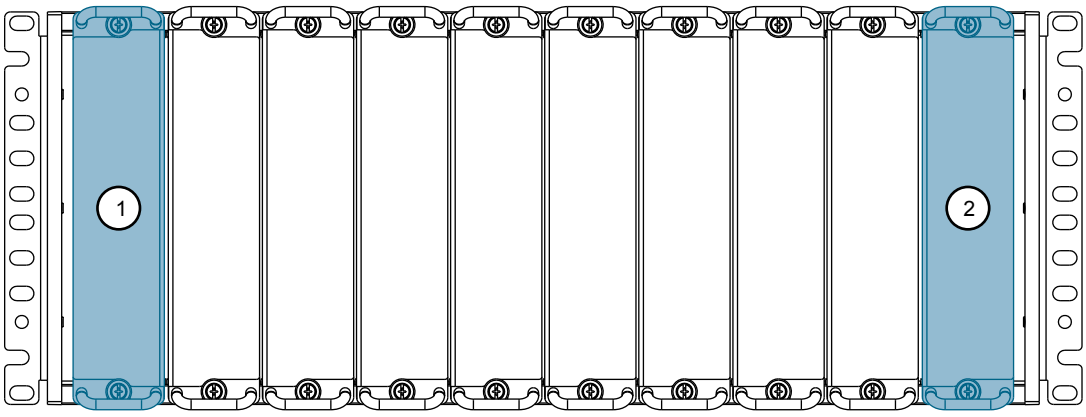


Figure 30: Power Supply Modules

1. Power Supply Module (PS1) **2.** Power Supply Module (PS2)

CAUTION!
Contamination hazard – risk of equipment damage. Prevent the ingress of water, dirts and other debris that may lead to premature equipment failure. Always make sure slots are not left empty.

NOTE
Power modules are hot swappable. When installing/removing a power module, it is not necessary to turn off power to the device.

Removing a Power Supply Module

To remove a power module, do the following:

1. Loosen the screws that secure the module to the chassis until the module can be removed.

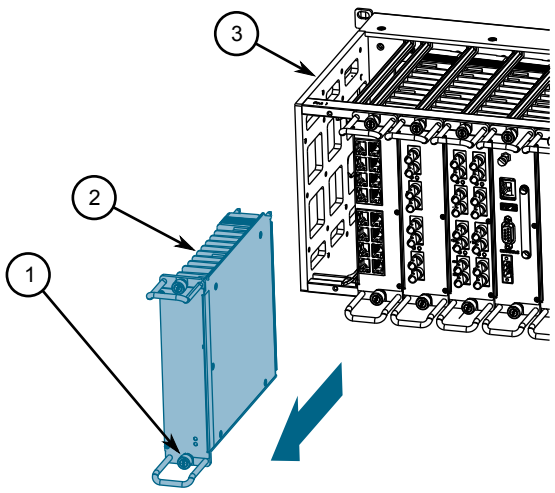


Figure 31: Removing a Power Supply

1. Screws **2.** Power Supply **3.** Chassis

2. Slide the module out of the chassis.
3. Install a new or blank module to prevent the ingress of dust and dirt.

Installing a Power Supply Module

To install a power module, do the following:

1. If equipped, remove the existing module.
2. Insert the module into the empty slot.

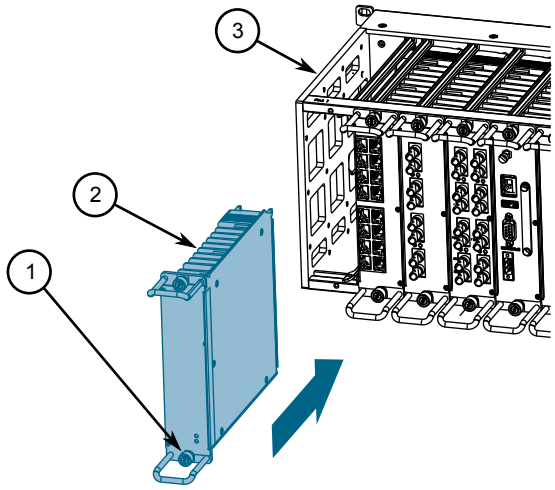


Figure 32: Installing a Power Supply Module

1. Screws **2.** Power Supply **3.** Chassis

3. Hand-tighten the screws to secure the power module to the chassis.
4. Turn on power to the device and confirm the module is receiving and supplying power. This is indicated by the LEDs on the module.

LED	State	Description
O	Green	The module is supplying power
I	Green	The module is receiving power

5 Technical Specifications

This section provides important technical specifications related to the device and available modules.

CONTENTS

Section 5.1

Power Supply Specifications

Power Supply Type	Input Range		Internal Fuse Rating	Max. Power Consumption[a]
	Min	Max		
HI (125/250 VDC)[b]	88 VDC	300 VDC	6.3 A, 250 V(T)[c]	110 W[d]
HI (110/230 VAC)[b]	85 VAC	264 VAC		

[a] *Power consumption varies based on the device configuration. Each 10/100Base-Tx port consumes roughly 1 W less than a fiber optic port.*

[b] *The HI power supply is the same power supply for both AC and DC.*

[c] *(T) denotes time-delay fuse. Internal fuse is not user-replaceable.*

[d] *Rating at 85 °C (185 °F) ambient temperature at worst-case load.*

Section 5.2

Failsafe Relay Specifications

Maximum Switching Voltage	Rated Switching Current	Isolation
30 VDC	2 A, 60 W	1500 V_{rms} for 1 minute
125 VDC	0.24 A, 30 W	
125 VAC	0.5 A, 62.5 W	
220 VDC	0.24 A, 60 W	
250 VAC	0.25 A, 62.5 W	

Section 5.3
Operating Environment

The RUGGEDCOM MX5000RE is rated to operate under the following environmental conditions.

Ambient Operating Temperature[ef]	-40 to 85 °C (-40 to 185 °F)
Ambient Storage Temperature	-40 to 85 °C (-40 to 185 °F)
Ambient Relative Humidity[g]	5% to 95%
Maximum Altitude	2000 m (6562 ft)

[e] *Measured from a 30 cm (12 in) radius surrounding the center of the enclosure.*

[f] *Operating temperature may vary based on the limitations of installed SFPs. Refer to the RUGGEDCOM SFP Transceivers Catalog for SFP temperature ratings.*

[g] *Non-condensing.*

Section 5.4
Mechanical Specifications

Weight (MX5000)	14-16 kg (30-35 lbs)
Weight (Enclosure)	68 kg (150 lbs)
Ingress Protection	IP64
Chassis Material (MX5000)	Aluminum
Chassis Material (Enclosure)	Aluminum Alloy

Section 5.5
Dimension Drawings

NOTE
All dimensions are in millimeters, unless otherwise stated.

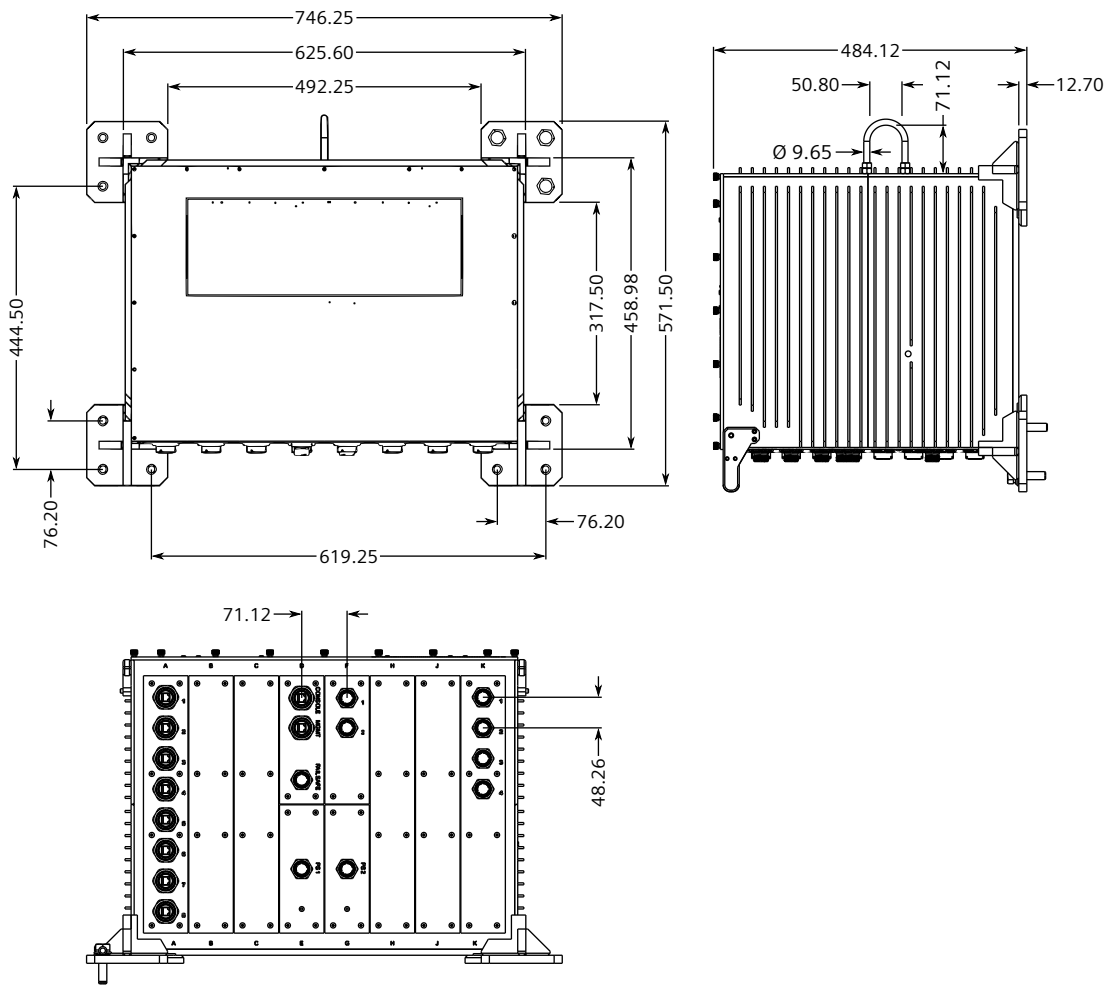


Figure 33: Overall Dimensions

6 Certification

The RUGGEDCOM MX5000RE device has been thoroughly tested to guarantee its conformance with recognized standards and has received approval from recognized regulatory agencies.

CONTENTS

Section 6.1

Approvals

The following sections detail the approvals issued for the RUGGEDCOM MX5000RE.

CONTENTS

Section 6.1.1

TÜV SÜD

This device is certified by TÜV SÜD to meet the requirements of the following standards:

- **CAN/CSA-C22.2 NO. 60950-1-07 (R2012)**
  Information Technology Equipment – Safety – Part 1: General Requirements (Bi-National standard, with UL 60950-1)
- **UL 60950-1**
  Information Technology Equipment – Safety – Part 1: General Requirements)

Section 6.1.2
European Commission (EC)

This device is declared by Siemens Canada Ltd to comply with essential requirements and other relevant provisions of the following EC directives:

- **EN 60950-1**
  Information Technology Equipment – Safety – Part 1: General Requirements
- **EN 61000-6-2**
  Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments
- **EN 60825-1**
  Safety of Laser Products – Equipment Classification and Requirements
- **EN 55022**
  Information Technology Equipment – Radio disturbance characteristics – Limits and methods of measurement
- **EN 50581**
  Technical Documentation for the Assessment of Electrical and Electronic Products with Respect to the Restriction of Hazardous Substances

The device is marked with a CE marking and can be used throughout the European community.

CE

A copy of the CE Declaration of Conformity is available from Siemens Canada Ltd. For contact information, refer to "Contacting Siemens".

Section 6.1.3
FCC

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment.

This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference on his own expense.

Section 6.1.4
FDA/CDRH

This device meets the requirements of the following U.S. Food and Drug Administration (FDA) standard:

- Title 21 Code of Federal Regulations (CFR) – Chapter I – Sub-chapter J – Radiological Health

Section 6.1.5
ISED

This device is declared by Siemens Canada Ltd to meet the requirements of the following ISED (Innovation Science and Economic Development Canada) standard:

- CAN ICES-3 (A)/NMB-3 (A)

Section 6.1.6
ISO

This device was designed and manufactured using a certified ISO (International Organization for Standardization) quality program that adheres to the following standard:

- **ISO 9001:2015**
  Quality management systems – Requirements

Section 6.1.7
RoHS

This device is declared by Siemens Canada Ltd to meet the requirements of the following RoHS (Restriction of Hazardous Substances) directives for the restricted use of certain hazardous substances in electrical and electronic equipment:

- **China RoHS 2**
  Administrative Measure on the Control of Pollution Caused by Electronic Information Products

A copy of the Material Declaration is available online at https://support.industry.siemens.com/cs/ww/en/view/109738831.

Section 6.1.8
Other Approvals

This device meets the requirements of the following additional standards:

- **IEEE 1613**
  IEEE Standard Environmental and Testing Requirements for Communications Networking Devices in Electric Power Substations
- **IEC 61850-3**
  Communications Networks and Systems for Power Utility Automation – Part 3: General Requirements
- **IEC 61000-6-2**
  Electromagnetic Compatibility (EMC) – Part 6-2: Generic Standards – Immunity for Industrial Environments

Section 6.2
MIL-STD Ratings

Standard	Description	Comments
MIL-STD 901D	Shock (Hard-Mounted)	Approved
MIL-STD 461	EMI	Approved
DOD-STD 1399	Magnetic Field (DC Magnetic Exposure)	Approved
MIL-STD 1399 (Section 300B)	Electrical Power Interface Standards for Shipboard Systems	Approved

Section 6.3
EMC and Environmental Type Tests

The RUGGEDCOM MX5000RE has passed the following EMC and environmental tests.

IEC 61850-3 EMC Type Tests

Test	Description		Test Levels	Severity Levels
IEC 61000-4-2	ESD	Enclosure Contact	+/- 8 kV	4
		Enclosure Air	+/- 15 kV	4
IEC 61000-4-3	Radiated RFI	Enclosure Ports	20 V/m	Note[a]
IEC 61000-4-4	Burst (Fast Transient)	Signal ports	+/- 4 kV @ 2.5 kHz	Note[a]
		DC Power ports	+/- 4 kV	4
		AC Power ports	+/- 4 kV	4
		Earth ground ports	+/- 4 kV	4
IEC 61000-4-5	Surge	Signal ports	+/- 4 kV line-to-earth, +/- 2 kV line-to-line	4
		DC Power ports	+/- 2 kV line-to-earth, +/- 1 kV line-to-line	3
		AC Power ports	+/- 4 kV line-to-earth, +/- 2 kV line-to-line	4
IEC 61000-4-6	Induced (Conducted) RFI	Signal ports	10 V	3
		D.C Power ports	10V	3
		AC Power ports	10V	3
		Earth ground ports	10V	3
IEC 61000-4-8	Magnetic Field	Enclosure Ports	100 A/m	
			1000 A/m for 1 s	5

Test	Description		Test Levels	Severity Levels
IEC 61000-4-29	Voltage Dips & Interrupts	DC Power ports	30% for 0.1 s, 60% for 0.1 s, 100% for 0.05 s	
		AC Power ports	30% for 1 period, 60% for 50 periods	
IEC 61000-4-11	Voltage Dips & Interrupts	AC Power ports	100% for 5 periods, 100% for 50 periods	
IEC 61000-4-12	Damped Oscillatory	Signal ports	2.5 kV common, 1 kV differential mode @1 MHz	3
		DC Power ports	2.5 kV common, 1 kV differential mode @1MHz	3
		AC Power ports	2.5 kV common, 1 kV differential mode @1MHz	3
IEC 61000-4-16	Mains Frequency Voltage	Signal ports	30 V Continuous, 300 V for 1 s	4
		DC Power ports	30 V Continuous, 300 V for 1 s	4
IEC 61000-4-17	Ripple on DC Power Supply	DC Power ports	10%	3
IEC 60255-5	Dielectric Strength	Signal ports	2 kV (Fail-Safe Relay output)	
		DC Power ports	2 kV	
		AC Power ports	2 kV	
	HV Impulse	Signal ports	5 kV (Fail-Safe Relay output)	
		DC Power ports	5 kV	
		AC Power ports	5 kV	

[a] *Siemens-specified severity levels*

IEEE 1613 EMC Type Tests

NOTE
The RUGGEDCOM MX5000RE meets Class 2 requirements for an all-fiber configuration and Class 1 requirements for copper ports.

Description		Test Levels
ESD	Enclosure Contact	+/-2 kV, +/-4 kV, +/- 8 kV
	Enclosure Air	+/-4 kV, +/-8 kV, +/-15 kV
Radiated RFI	Enclosure ports	35 V/m
Fast Transient	Signal ports	+/- 4 kV @ 2.5 kHz
	DC Power ports	+/- 4 kV
	AC Power ports	+/- 4 kV
	Earth ground ports	+/- 4 kV
Oscillatory	Signal ports	2.5 kV common mode @1 MHz
	DC Power ports	2.5 kV common, 1 kV differential mode @ 1 MHz

Description		Test Levels
	AC Power ports	2.5 kV common, 1 kV differential mode @ 1 MHz
HV Impulse	Signal ports	5 kV (Fail-Safe Relay output)
	DC Power ports	5 kV
	AC Power ports	5 kV
Dielectric Strength	Signal ports	2 kV
	DC Power ports	2 kV
	AC Power ports	2 kV

Environmental Type Tests

Test	Description		Test Levels
IEC 60068-2-1	Cold Temperature	Test Ad	-40 °C (-40 °F), 16 Hours
IEC 60068-2-2	Dry Heat	Test Bd	85 °C (185 °F), 16 Hours
IEC 60068-2-30	Humidity (Damp Heat, Cyclic)	Test Db	95% (non-condensing), 55 °C (131 °F), 6 cycles
IEC 60255-21-1	Vibration		2 g @ 10 - 150 Hz
IEC 60255-21-2	Shock		30 g @ 11 mS